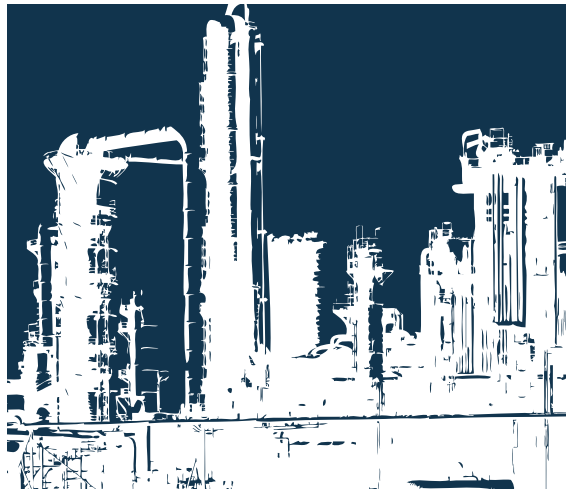
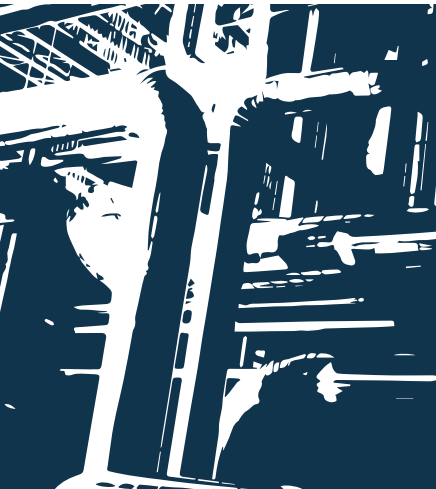
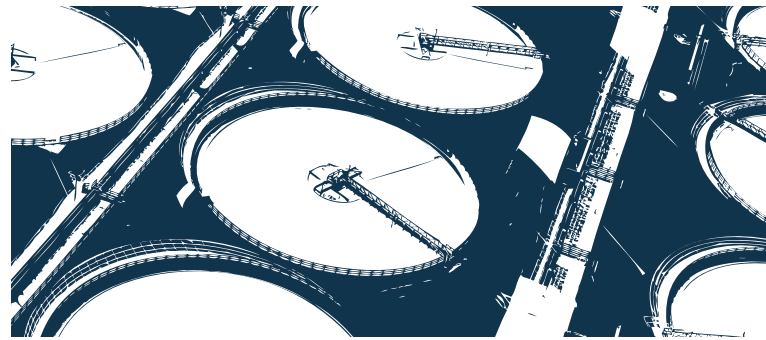
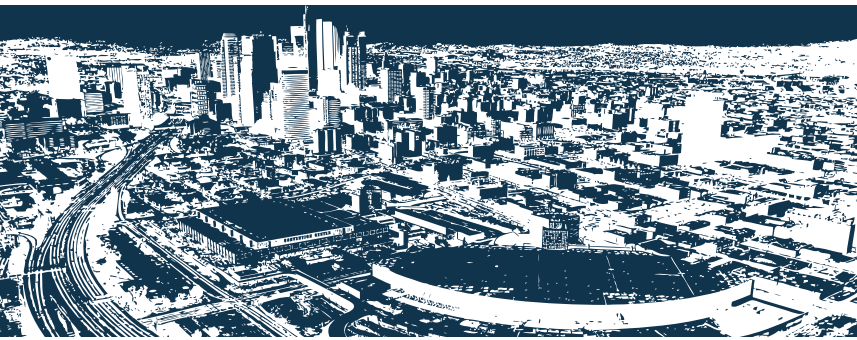
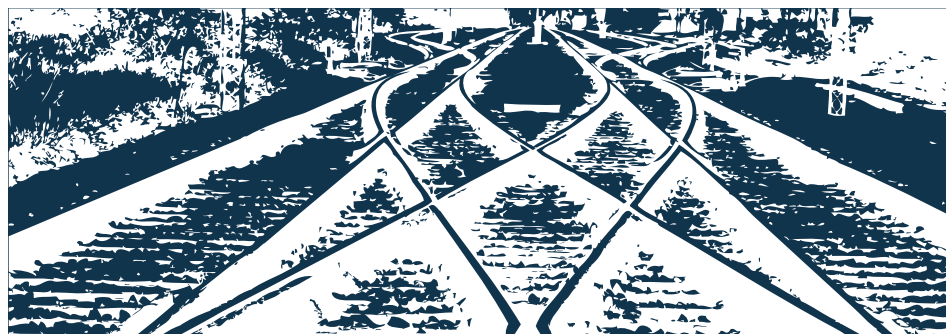


# THE AUTOPLANT PROJECT SHOWCASE



Extraordinary Infrastructure of the *Be Inspired* Awards





Bentley's mission is to provide innovative software and services for the enterprises and professionals who design, build, and operate the world's infrastructure – sustaining the global economy and environment for improved quality of life.

*The AutoPLANT Project Showcase* and *The Year in Infrastructure* series of publications are project yearbooks published by Bentley Systems, Incorporated that showcase the extraordinary work of Bentley users sustaining the world's infrastructure.

For information about how to enter your innovative project for consideration in the next *Be Inspired Awards* competition or for additional information about this program, visit [www.bentley.com/beinspired](http://www.bentley.com/beinspired).

#### ONLINE VERSIONS

Digital versions of *Be Inspired Awards* publications are available online at [www.bentley.com/yearininfrastructure](http://www.bentley.com/yearininfrastructure). Choose to view a specific issue or search within each issue using terms, titles, or keywords.

Also browse Bentley's *Be Inspired Project Portfolios* at [www.bentley.com/projects](http://www.bentley.com/projects), which feature the winners and finalists in Bentley's annual *Be Inspired Awards* competition. Through these multimedia portfolios of exemplary project achievements, Bentley shares innovative best practices with the architects, engineers, constructors, geospatial professionals, and owner-operators who sustain the world's infrastructure.



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# Infrastructure and Innovation

The professionals who design, build, and operate infrastructure strive to combine advances in engineering knowledge with improvements to the quality of life for people around the world – and that goal is what drives the amazing projects presented in *The AutoPLANT Project Showcase*. Within these pages you will find works of infrastructure that are inspirational on many levels: for the distances they span, the people they connect, the air and water they clean, and the renewable energy they produce.

Each of the projects presented here have been nominated for Bentley's *Be Inspired Awards*, an annual global competition recognizing outstanding achievements in design and delivery of infrastructure. They demonstrate our global society's resilience in the face of tremendous challenges, both economic and environmental, and serve as a testament to the ability of engineers and architects, contractors, and owner/operators around the globe to solve any problem, great or small.

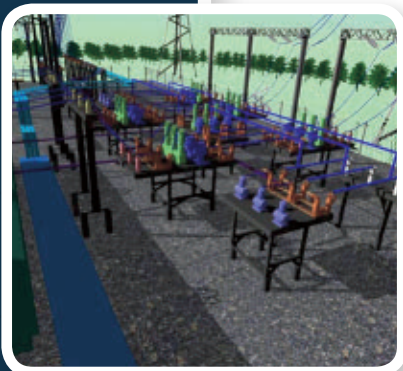
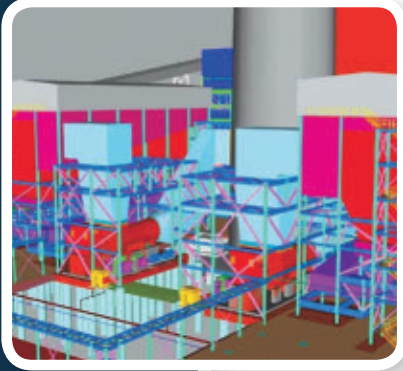
These projects also represent tremendous innovation in the use of AutoPLANT to leverage information modeling in integrated projects to deliver intelligent infrastructure that is measured in terms of operational efficiency, constructability, safety, and use of energy and nonrenewable resources. The projects you will read about here are state of the art, employing AutoPLANT to create new and sustainable value in every stage of the infrastructure lifecycle.

The breadth of infrastructure supported and the global reach of solutions indicate why AutoPLANT is the premier plant design software applied around the world, providing plant engineers and designers with a complete set of integrated software applications that are highly intuitive and easy to use. Each project has its own story and unique way in which AutoPLANT and other Bentley products have been used to gain ROI for both owner-operators and EPCs.

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# Energy Utilities

Organizations that plan, design, build, and operate utilities continuously strive to increase productivity, automate engineering tasks, and deliver intelligent and highly accurate information models. The projects in this category exhibit best practices in the planning, engineering, and management of utility infrastructure.

# ENERGY UTILITIES

## Alcan Engineering

### Alcan Gove Third-Stage Expansion – G3 Project

Gove Peninsula, Australia

An AUD 2 billion expansion of the Alcan Gove alumina refinery on the Gove Peninsula in Australia increased production capacity from 2 million tons to 3.8 million tons per year. Because the refinery is in a remote location, finding a skilled workforce large enough to complete this project using traditional methods on site would have been almost impossible.

So Alcan split the project into 600 preassembled modules, each weighing up to 2,000 tons and using AutoPLANT, the modules were fabricated and fitted-out off site in five locations. The modules were then shipped to the site where they were quickly and efficiently installed. Alcan reduced the expected project completion time by six months, which gave it an extra six months of increased production capacity, or roughly 900,000 tons of alumina.



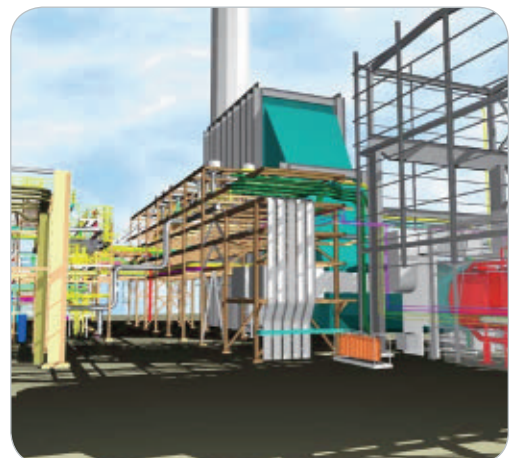
## Ansaldo Energia

### Eni Power Combined Heat and Power Plants

Genova, Italy

The Eni Power project consists of new combined heat and power plants in Italy that provide steam to refineries and electrical power to the Italian national grid. The plants are based on natural gas, single-fuel, 380 megawatt, combined-cycle modules for a global installed power of about 3,500 megawatts.

Ansaldo Energia used AutoPLANT to create a basic 3D model, in which it incorporated both its design work and that of Snam Progetti, allowing the firm to quickly solve problems related to space management and interface topics. The 3D model allowed the company to quickly and efficiently solve problems related to space management and interfaces.



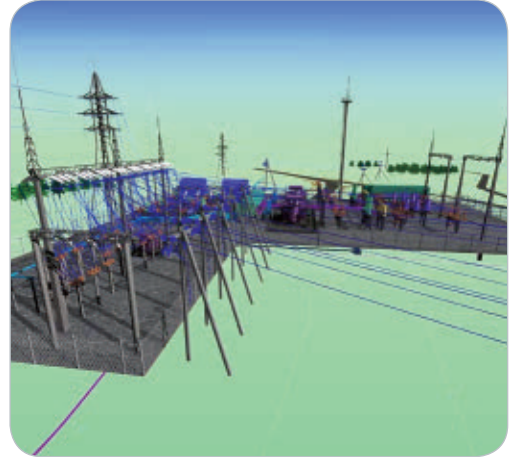
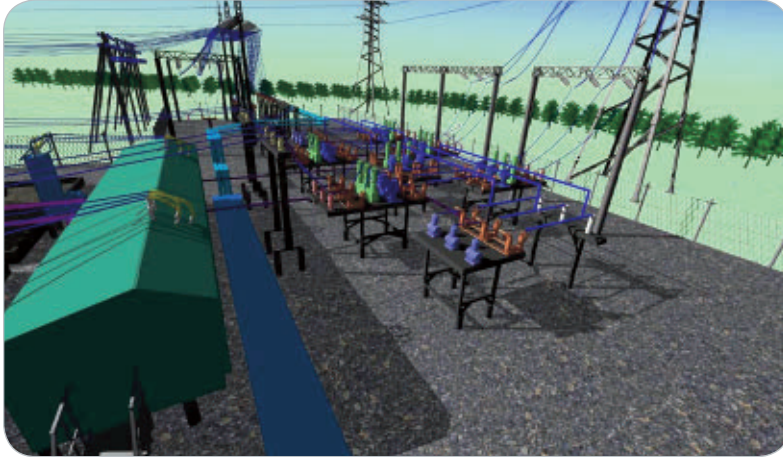
BashNIPneft

**Re-engineering Substation 35/6 Kilovolts**

Ufa, Russia

BashNIPneft is the research and development institute affiliated with the exploration and production unit of JSOC Bashneft, an integrated oil and gas company engaged in exploration, development, and production of petroleum resources in the Republic of Bashkortostan, Russia. BashNIPneft recently designed Electric Substation 35/6-kilovolt Leonidovka in the city of Ufa.

Using AutoPLANT Equipment, AutoPLANT Raceways, and ProStructures enabled complex 3D modeling of the facility, power supply systems, open distribution service, overhead transmission lines, fiber-optic links, and flexible bus bar. The software improved accuracy and reduced design time.

**WINNER**

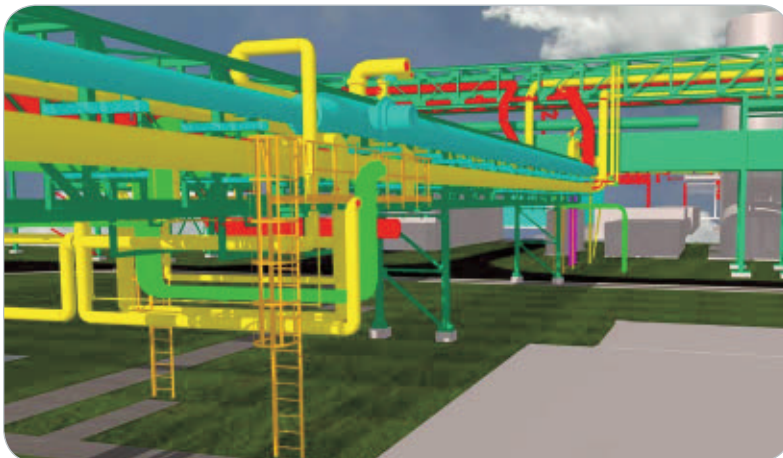
BSPiR Energoprojekt-Katowice S.A.

**The Coke Plant Przyjazn**

Dabrowa Gornicza, Poland

The Przyjazn Coke Plant in Poland consists of about 250 buildings/structures and four coke oven batteries that each contains 80 chambers. Annual production at the facility is roughly 2.6 million tons of coke, and the goal of the project was to increase this number by 1.4 million tons. The project included construction of the coke oven battery itself and modernization of the Coal Derivatives Production Department.

BSPiR Energoprojekt-Katowice S.A. used ProjectWise, MicroStation, PlantSpace, and AutoPIPE enabled junior staff members to participate in the design work. In addition, interoperability provided better collaboration among engineering offices that use AutoPLANT and other applications – enabling models of pipelines and civil structures to be exchanged easily.



2007 WINNER



# ENERGY UTILITIES

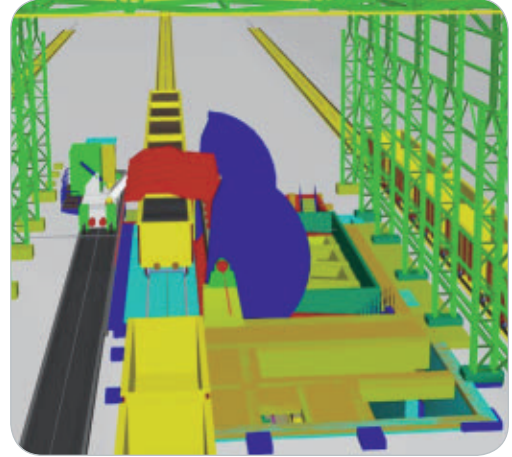
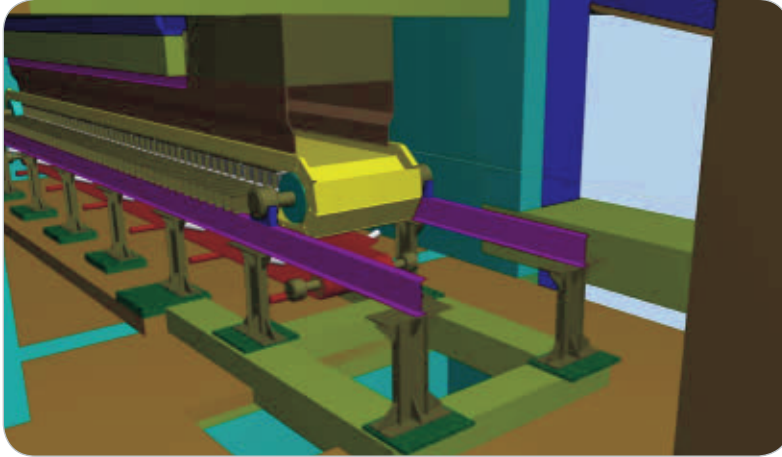
Desein Pvt Ltd

## Chhabra Thermal Power Project

Chhabra, India

Located in the Indian state of Rajasthan, Chhabra is becoming a power-generation hub with the development of modern plants throughout the region. Desein was selected to design a 2x250 megawatt thermal power plant near the village of Chowki Motipura. Three-dimensional modeling and pre-planned layout of the entire plant allowed dynamic walkthroughs for operations and maintenance personnel to view the plant before construction.

AutoPLANT, Bentley speedikon Architectural, and ProSteel enabled the direct exchange of data between the 3D model, process and instrumentation diagrams, and isometric and orthographic drawings to maintain consistent and up-to-date information. The tools improved productivity, reduced design cycle time, and cut costs through design optimization. Accurate material take-offs contributed to procurement and construction savings as well.



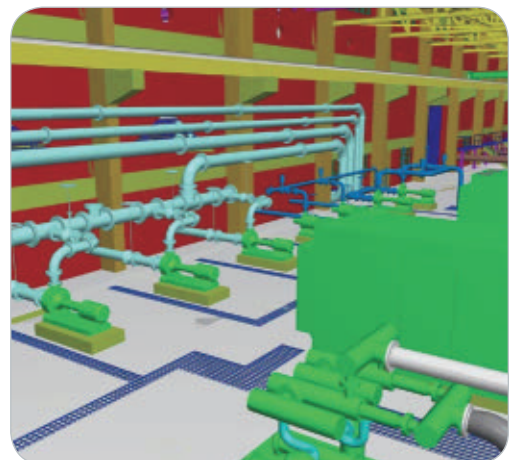
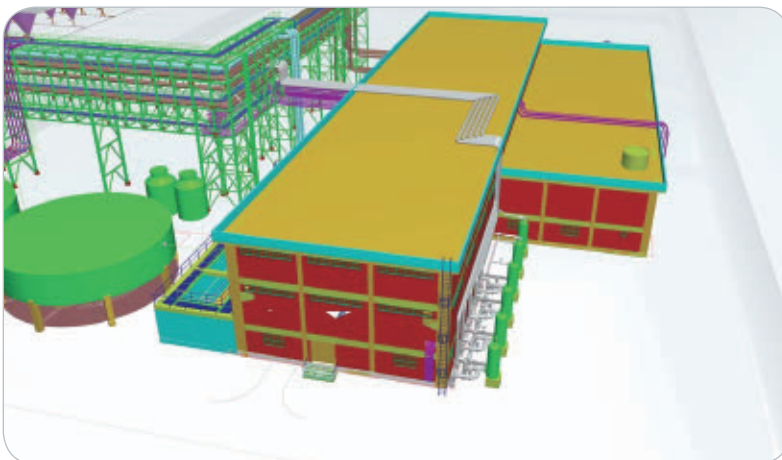
Desein Pvt Ltd

## Mundra

Mundra Port, India

The USD 25.6 million, 4,000 megawatt coal-fired plant located in Mundra Port will be the most energy-efficient plant in India. To meet a three-month design schedule, Desein chose to implement 3D modeling tools for the first time. A user familiar with AutoPLANT led a team of five through design and 2D drawing extraction.

Isometric drawings were generated for client approval in less time, and design standards for piping and cable tray fittings were enforced for the first time. Clash detection and interference checks eliminated errors before construction, saving time and money in the field. Overall, time savings was approximately 60 percent and quality improved drastically.



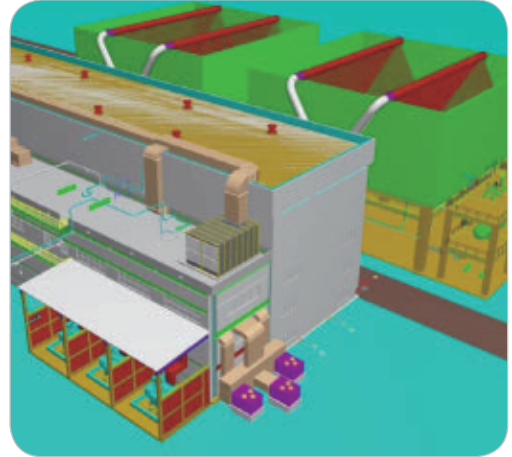
Desein-Indure Pvt Ltd

### 2x20 MW Captive Fujairah Cement Industries

Dibba Al-Fujairah, United Arab Emirates

The Fujairah Cement Industries (FCI) 2x20 megawatt captive power plant supplies energy to the FCI cement plant in the United Arab Emirates. As the engineering, procurement, and construction contractor, Desein-Indure executed the project using 3D design technology for the first time. Indure is part of the Desein-Indure group of companies. AutoPLANT enabled multiple disciplines on the Desein-Indure team to work simultaneously.

Designs were easily imported to/exported from analysis packages. Integrated 3D models were reviewed to detect and resolve clashes. Changes recommended by reviewers were easily incorporated. These workflows enabled Desein-Indure to create plant designs in less time than in the past. Automated generation of engineering deliverables took up to 40 percent less time than manual processes.



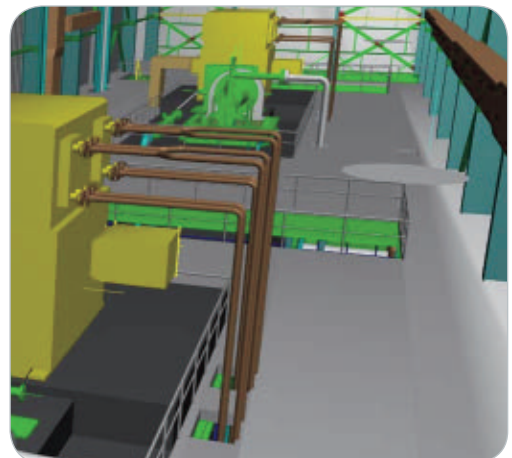
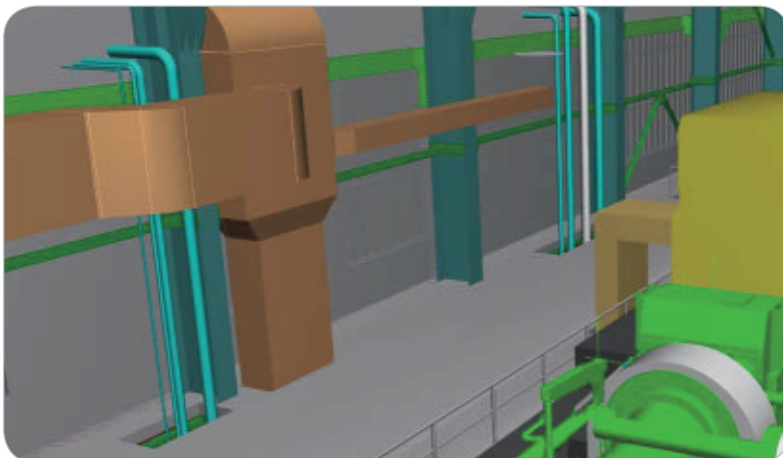
Desein-Indure Pvt. Ltd.

### 2x20 MW Thermal Power Plant

Dibba, United Arab Emirates

Desein-Indure performed complete 3D modeling for a 2x20 megawatt thermal power plant in Dibba, United Arab Emirates. The small multidiscipline project team received training in 3D design using AutoPLANT and completed the modeling within four months. All clashes were resolved, the design was optimized, and the layout drawings were prepared.

The execution of this USD 200 million project demonstrated the advantages of a 3D platform. AutoPLANT products were used, including modules for P&ID, equipment, piping, and raceways. In addition, the project team used MicroStation, ProSteel, Bentley Navigator, and Bentley speedikon. Design time was reduced by about 25 percent and costs by about 12 percent.



# ENERGY UTILITIES

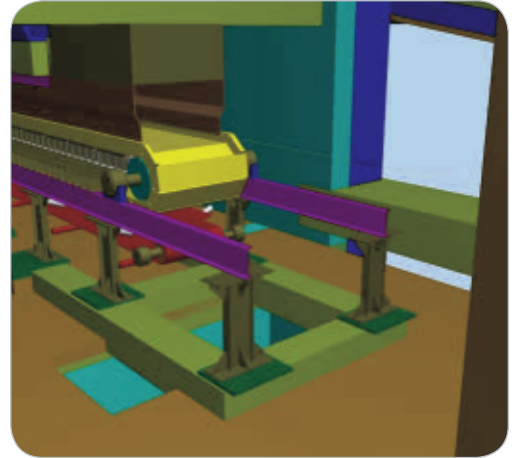
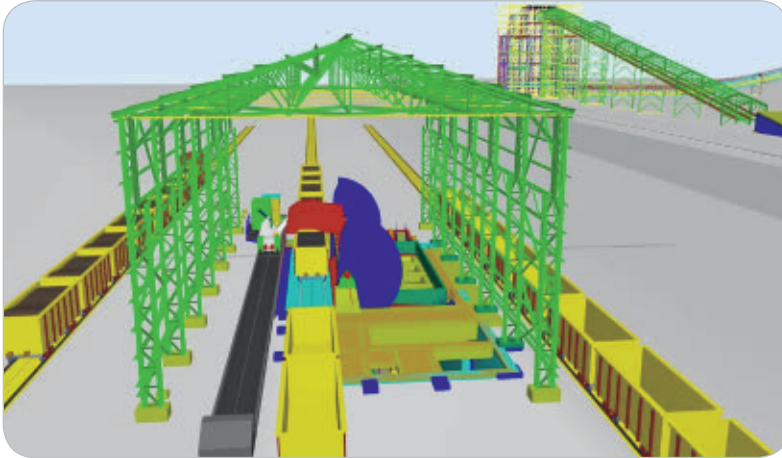
Desein-Indure Pvt Ltd

## Chhabra Coal Handling Unit

Baran, India

Rajasthan Rajya Vidyut Utpadan Nigam (RVUN) develops power projects in the state sector as well as operates and maintains state-owned power stations. RVUN's USD 880 million project under construction in India is a 2x250 megawatt power plant. Indure, part of the Desein-Indure group of companies, was involved in the RCC works, turbine generator bay, boiler, coal handling, electrostatic precipitator, ash handling, and other works. AutoPLANT and Bentley speedikon Architectural were used to achieve design objectives.

AutoPLANT's data-centric, rule-based system enabled full work sharing. Engineering flexibility and productivity were improved, resulting in quality designs that required less rework and revision. Automated drawing production also contributed to an efficient workflow. Compared to other applications, AutoPLANT produced nearly 60 percent time savings in operability and deliverables.



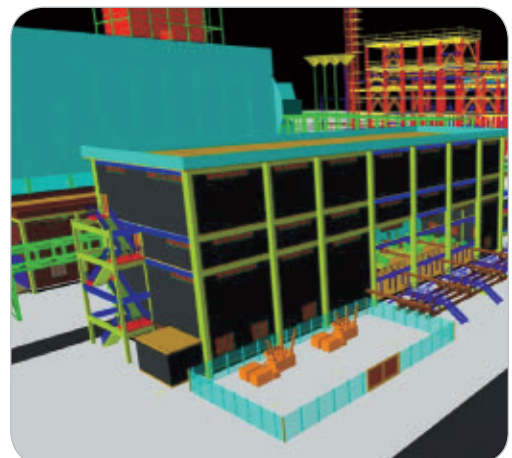
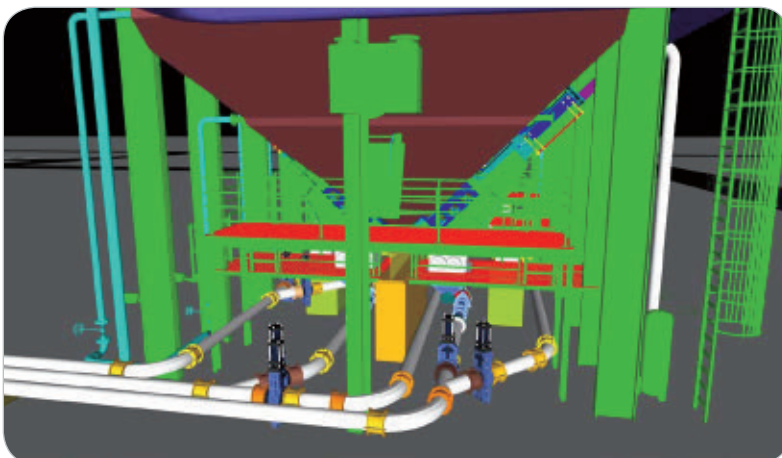
Desein-Indure Pvt. Ltd.

## VISA Raigarh Super Thermal Power Project

Raigarh, India

VISA Power awarded Desein-Indure a USD 400 million engineering, procurement, and construction contract for an ash-handling plant at its super thermal power plant in Raigarh, India. Limited land space was a major challenge. The 3D modeling for the plant was started simultaneously with the basic engineering and design. Using data, catalogs, and specifications built for previous projects reduced the development time for piping and steel.

The fast-track project was executed using AutoPLANT, which provided a 3D environment for virtual walkthroughs and design optimization. MicroStation, Bentley Navigator, and ProSteel interoperability allowed project information to be shared by multiple disciplines. Drawings were extracted only after clash-free routing. Using 3D design shortened the design cycle by 15 percent and reduced project costs by 10 percent.





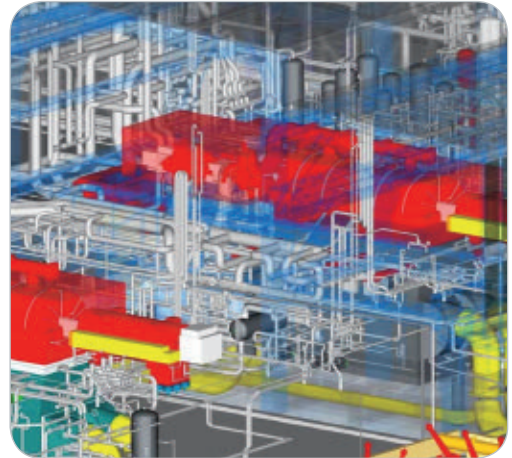
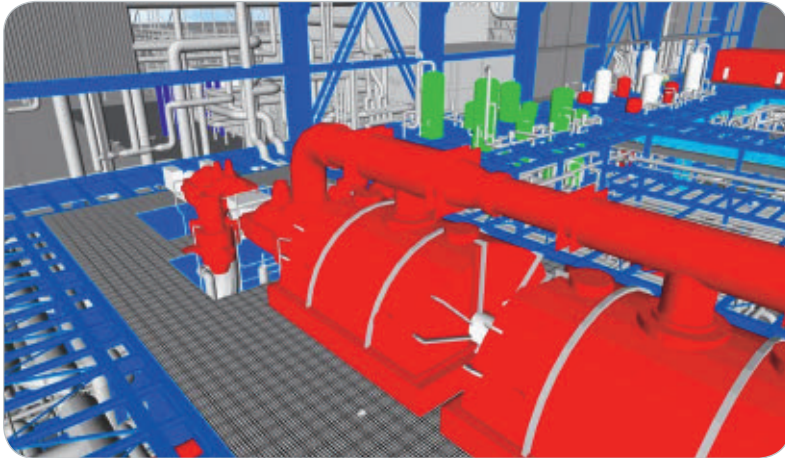
Enel Power

## Torre Valdaliga Nord Project

Torre Valdaliga, Italy

This project in Italy transformed a traditional heavy-oil-fed power station running four 660-megawatt electrical capacity units into a low-pollution, coal-fed power station running three 660-megawatt electrical capacity units. Major revamping activities included complete replacement of the boilers, replacement of the power generation islands, and work on some external areas.

AutoPLANT stored 2D and 3D plant data in a consistent database, which reduced design errors. In addition, the 3D design data allowed for the quick production of extremely accurate construction documents (isometrics) as well as material lists. The 3D model allowed the company to fully manage all of the plant data in digital format.



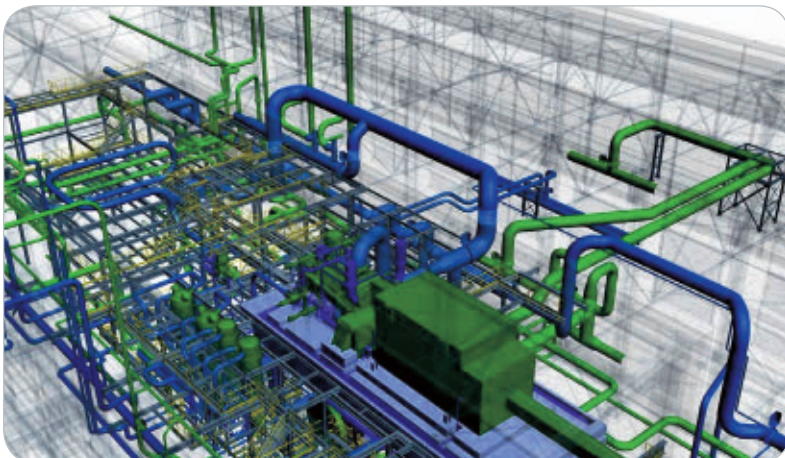
Energotechnika Projekt Sp z o.o.

## EC Zeran Modernization

Warszawa, Poland

Energotechnika Projekt's primary objective was to develop and execute a capital project on schedule and within budget. For the EC Zeran Modernization project in Warszawa, Poland, the firm replaced an aging turbine with modern equipment that optimized the fluidized boiler, enabling greater efficiency in thermal-to-electric energy conversion.

The challenge was to install the modern turbine in the existing facilities and coordinate installation between branches within a short time. The design team used Bentley Structural, AutoPIPE, and AutoPLANT to shorten design time and reduce the number of people involved in the project.





## ENERGY UTILITIES

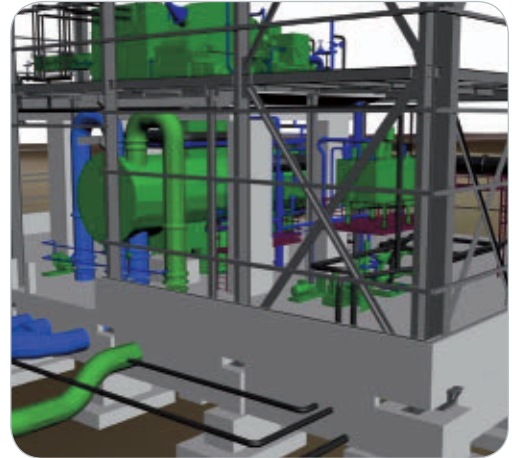
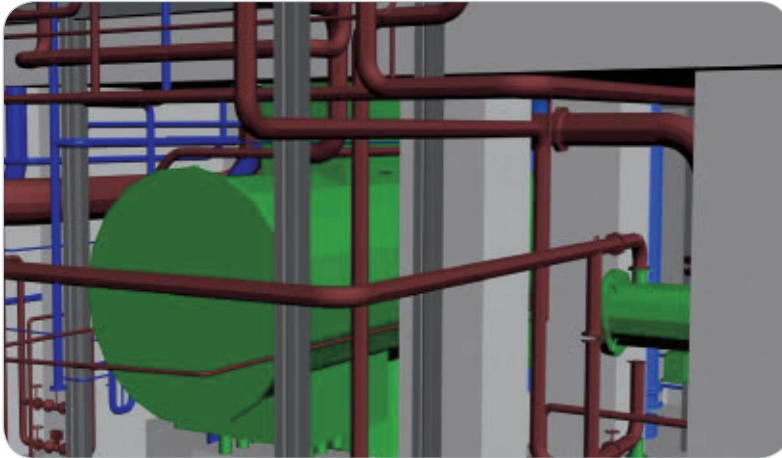
Energotechnika Projekt Sp z o.o.

### IP Kwidzyn Power Plant Expansion

Kwidzyn, Poland

Energotechnika Projekt is one of the largest engineering, procurement, construction, and project management companies in Poland. The goal of the IP Kwidzyn Power Plant Expansion project was to improve plant efficiency and production capacity while decreasing environmental emissions.

The primary goal was to quickly connect the expansion to existing facilities and coordinate installation between branches. The design team used Bentley Structural, AutoPIPE, and AutoPLANT to overcome challenges involved in this USD 26 million project to achieve cost savings.



ESI Inc. of Tennessee

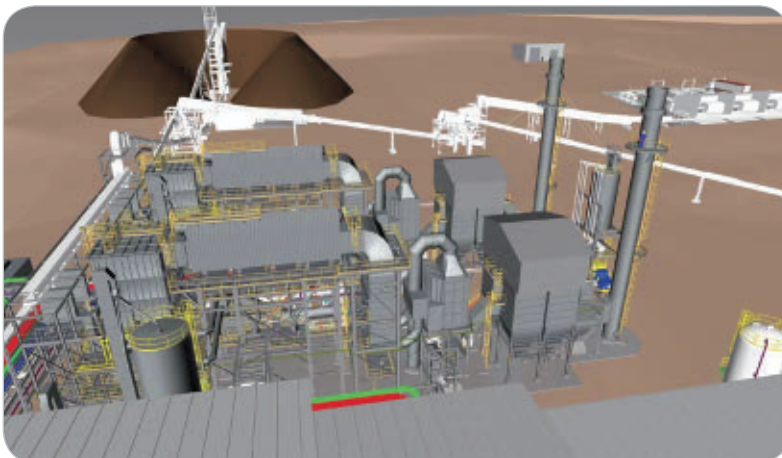
### Department of Energy – Biomass Cogeneration Facility

Aiken, South Carolina, United States

**WINNER**

With the development of clean, renewable energy emerging as the growth industry in the 21st century, the United States Department of Energy (DOE) is constructing a new biomass facility located at the Savannah River Site in Aiken, S.C. The new Biomass Cogeneration Facility will replace a deteriorating, inefficient coal powerhouse and oil-fired boilers and generate savings of approximately USD 35 million a year in energy, operation, and maintenance costs while removing 100,000 tons per year of greenhouse gases from the site's emissions.

ESI Inc. of Tennessee was contracted to engineer and design the energy-efficient plant, and used AutoPLANT to facilitate a more effective means of communication among the contractors, vendors, engineers, and the client, creating cost and time-saving efficiencies in all aspects of the design, engineering, and construction processes. Snapshot views from the 3D model are being used instead of traditional 2D orthographic drawings on site to expedite installation.



2010 WINNER

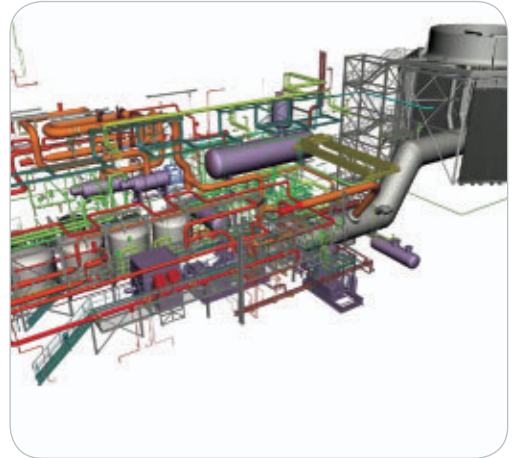
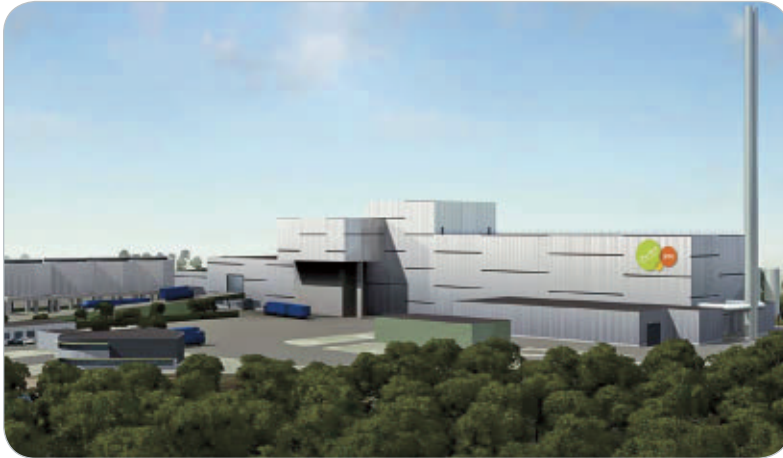
Fabricom GDF Suez

### SITA Re-Energy Bavaro Project

Roosendaal, Netherlands

Bavaro is a USD 31.8 million SITA Re-Energy project in Roosendaal, Netherlands. It is a high-efficiency incineration installation for industrial and domestic waste with a capacity of 291,000 tons a year. Fabricom's project goals for this waste-to-energy installation were to increase capacity to meet the growing demand for waste disposal and to recover more sustainable energy from waste.

Fabricom relied on AutoPLANT, AutoPIPE, and ProSteel for delivery of 2D and 3D information, leading to faster communication among all of the parties involved. The project was based on interoperability between services. By reusing the data for all civil, building, plant, and structural project teams, the company saved time and improved data reliability.



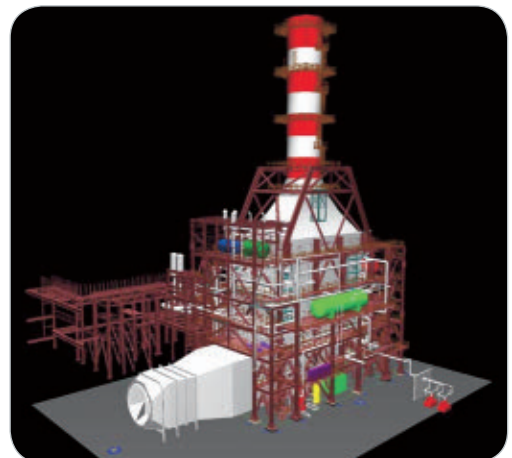
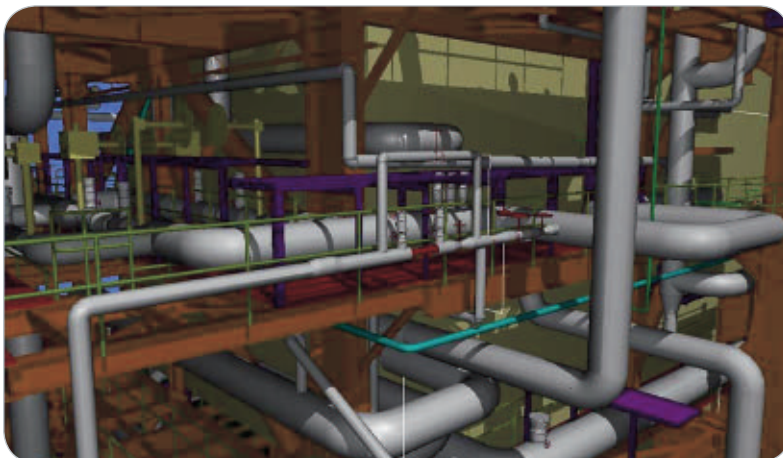
Larsen & Toubro Ltd

### 2X384 MW GREL Heat Recovery Steam Generators

Rajahmundry, India

Larsen & Toubro India executed a gas-based combined-cycle power plant near Rajahmundry in India. The power block includes gas turbine generators, triple-pressure reheat heat recovery steam generators, and steam turbine generators. Challenges were to deliver engineering outputs in a compressed time schedule and integrate work across locations.

Larsen & Toubro built-to-scale and realistic images of the heat recovery steam generators, developed a 3D model at two different locations, and improved team and design review communications. The project team used AutoPLANT to detail most components and ensure that layouts were free of interference, and shared the 3D model with the project site to facilitate site construction and resolve discrepancies.





## ENERGY UTILITIES

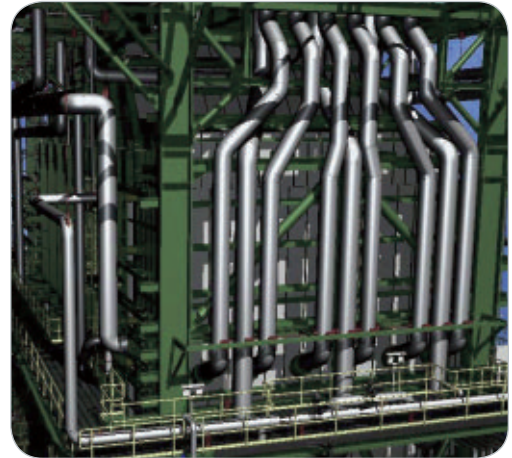
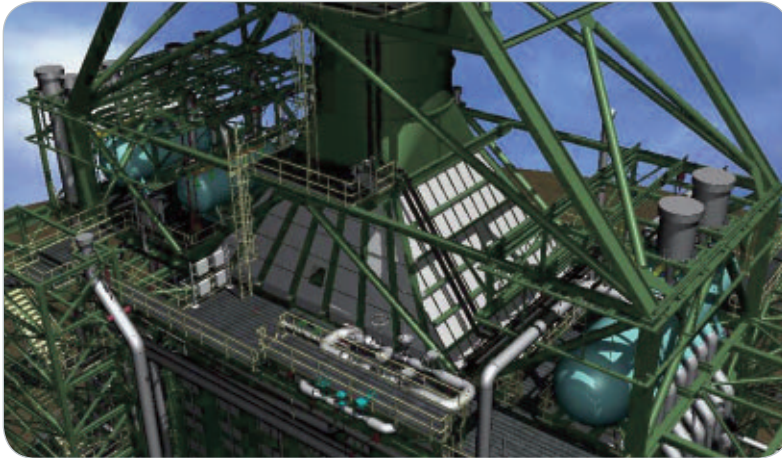
Larsen & Toubro Ltd

### 375 Megawatt GSECL Dhuvaran III

Anand, India

Gujarat State Electricity Corporation is setting up a 375-megawatt combined cycle power plant at Dhuvaran in the Anand district of Gujarat, India. Larsen & Toubro Limited designed and manufactured the power heat recovery steam generator. Product integration allowed the company to model each area and then bring the models together for clash detection.

AutoPLANT was used to engineer the equipment, electrical, instrumentation, and piping. Larsen & Toubro exported the STAAD.Pro structural model into ProStructures for development, which reduced engineering man-hours by 10 percent. The detailed model helped visualize and plan erection activity more rapidly. Bentley Navigator ensured a negligible probability of clashes and zero rework during shop fabrication.



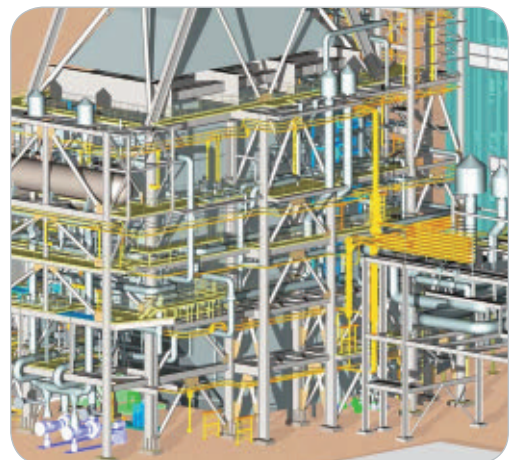
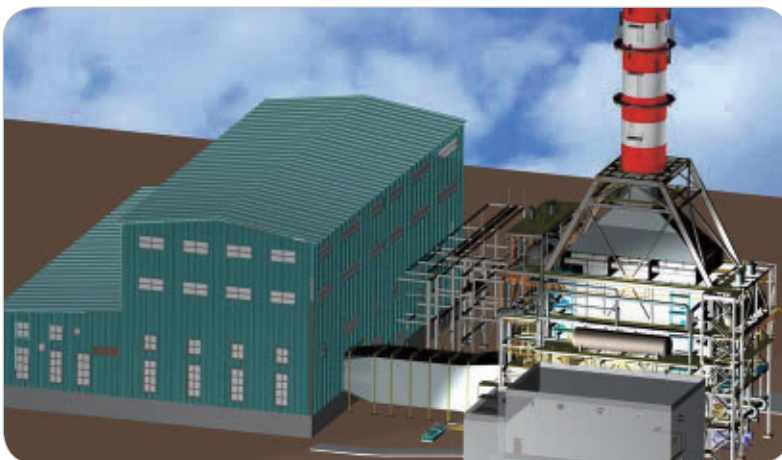
Larsen & Toubro Ltd

### HRSG for 388 MW Vemagiri Combined Cycle Power Plant

Vemagiri and Konaseema, India

Larsen & Toubro is the EPC for two gas-based combined cycle power plants. This project involved heat recovery steam generators (HRSGs). The HRSG in this project weighs more than 3,400 metric tons and includes 1,500 metric tons of heat exchange modules supported by 850 metric tons of steel structure.

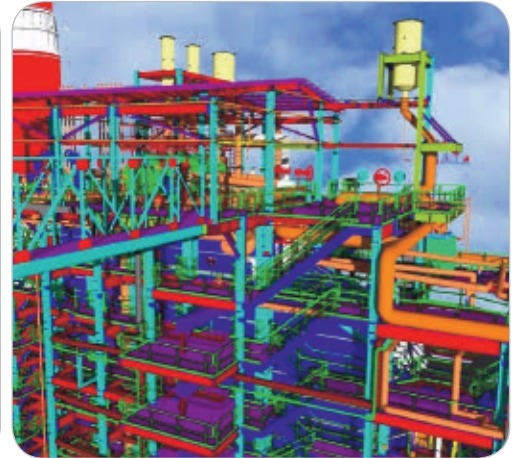
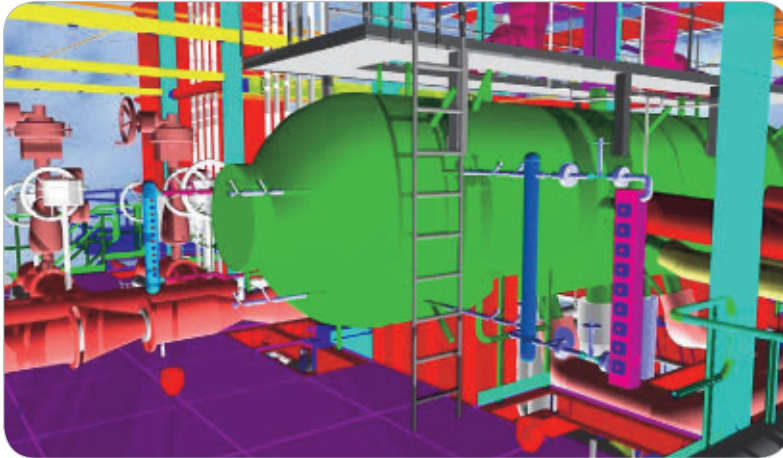
Larsen & Toubro used AutoPLANT to detail most components of the HRSG and to ensure that layouts were free of interference. The firm shared the 3D model with site designers using AutoPLANT Explorer NWD export file format, which eased site construction and resolution of discrepancies.



Larsen & Toubro Ltd  
**HRSGs for Cogeneration Power Plant**  
 Panipat, India

Larsen & Toubro is the EPC contractor for a gas-based combined cycle power plant at the Naphtha Cracker complex. The power block includes five 25-megawatt gas turbine generators as well as single-pressure heat recovery steam generators and conventional oil-fired (utility) boilers that drive three double-extraction condensing-type steam turbine generators.

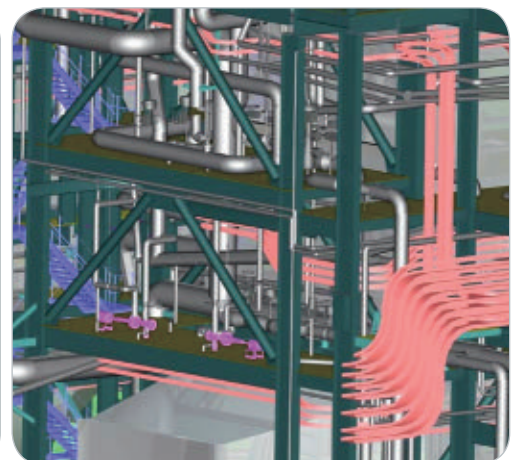
The project required Larsen & Toubro to build a 3D model of this project in Intergraph PDS. However, given the firm's experience using AutoPLANT, the project team chose to use Bentley software and convert the model into PDS. MicroStation enabled the team to work in parallel across disciplines and integrate design outputs from multiple locations and agencies.



Larsen & Toubro Ltd  
**Konaseema HRSR Project**  
 Konaseema, India

Larsen & Toubro was the EPC for two gas-based combined cycle power plants in India. The power block for Konaseema includes two 140-megawatt gas turbine generators, two triple-pressure heat recovery steam generators connected with a bypass arrangement for flue gas, and a steam turbine generator in a 2-2-1 configuration.

The design team opted to work in parallel on all fronts, including structures, equipment, and piping. AutoPLANT detailed most components and ensured that layouts were free of interference. It shared the 3D model with the site team using the AutoPLANT Explorer NWD export file format, which eased site construction and resolution of discrepancies.





## ENERGY UTILITIES

Monsanto Enviro-Chem Systems, Inc.

### Powerhouse Renovation

St. Louis, Missouri, United States

WINNER

This project replaces four existing boilers in a power plant with four new boilers. The total capacity of the new boilers is 600,000 pounds per hour of 200 psig (nominal) steam. Each will be tied into the existing steam distribution system. The existing power plant systems were upgraded to integrate the new boilers into the overall site operating system.

By deploying AutoPLANT Explorer to the desktops of nonCAD personnel, the firm was able to make critical design decisions sooner and more effectively. It was able to equip laptop computers with the software and gather field information more effectively. The firm also deployed AutoPLANT Explorer to field construction personnel for a level of detail at the construction site.



2005 WINNER

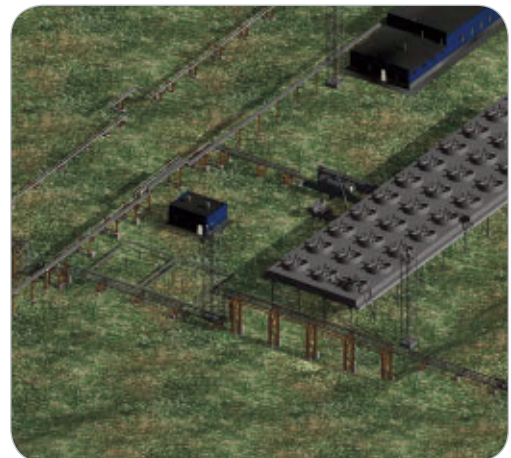
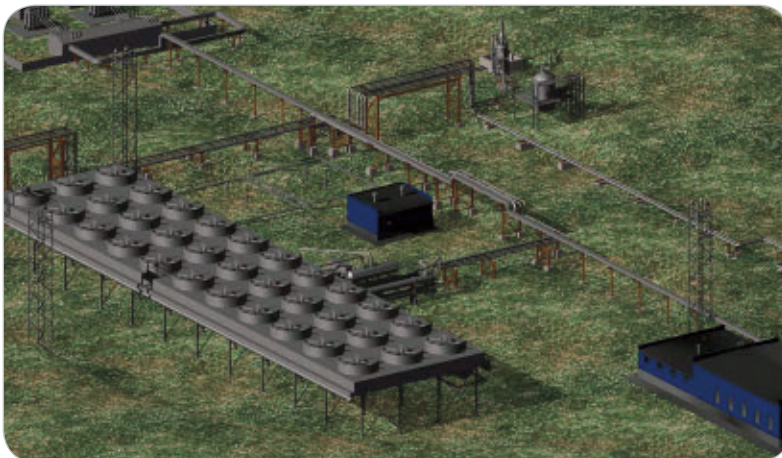
North-West Engineering Company

### Mendeleevskaya Geothermal Power Station

Yuzhno-Kuril'sk, Russia

As part of a multimillion-dollar investment in infrastructure on the Kuril Islands, Russia is building a geothermal power plant on Kunashir Island. North-West Engineering Company was contracted to design the geothermal power station to supply heat and electric power to the city of Yuzhno-Kuril'sk. The USD 26 million power station will improve the economic potential of the region without detriment to the environment.

The project team used AutoPLANT for AutoCAD to create a multidisciplinary work environment. Integrated 3D models were reviewed for errors and clashes. The creation of 3D models reduced design time by one month and reduced the cost of design by USD 25,000. Upon completion of the plant, the naturally recurring geothermal energy will provide a clean, renewable resource.



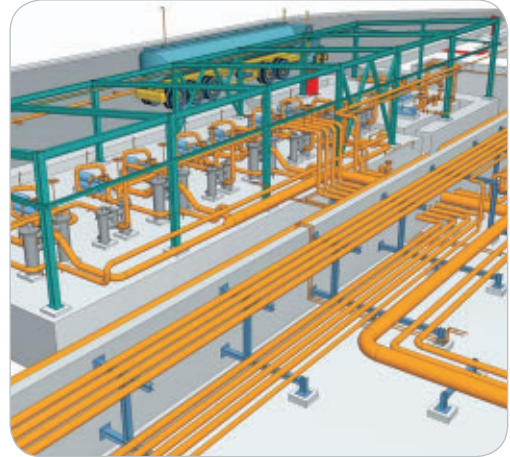
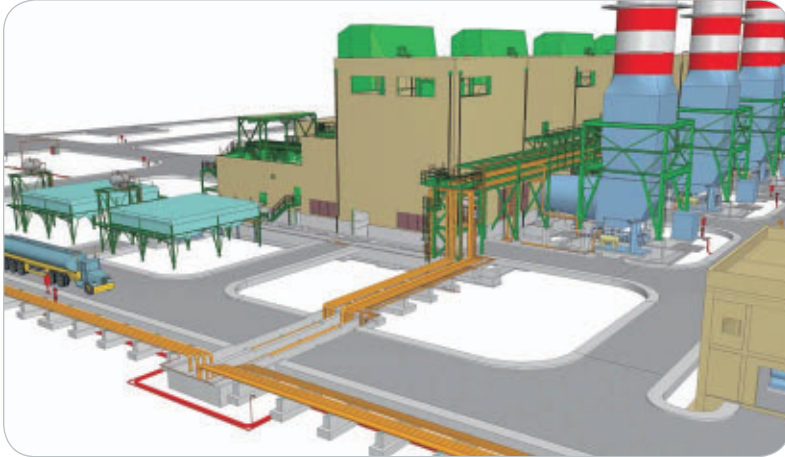
Projenia S.r.l.

**6th of October Power Plant**

6th of October City, Cairo, Egypt

Cairo Electricity Production Company awarded a EUR 245 million engineering, procurement, and construction contract to Ansaldo Energia to build the 6th of October Power Plant on the outskirts of Cairo, Egypt. The 600-megawatt open-cycle power generation plant consists of four 150-megawatt gas turbines. Projenia was retained to perform detail design of the plant, including civil and architectural works, piping and mechanical design, and electrical and instrumentation design.

The short nine-month schedule was achieved by using the AutoPLANT integrated 3D environment and Bentley AutoPIPE and STAAD.Pro calculation tools to exchange information among engineering disciplines. Bentley solutions produced an optimal design in 15 percent less time and enabled a faster erection schedule – just 14.5 months – by producing a clash-free, erection-oriented arrangement that required minimal on-site queries or claims.



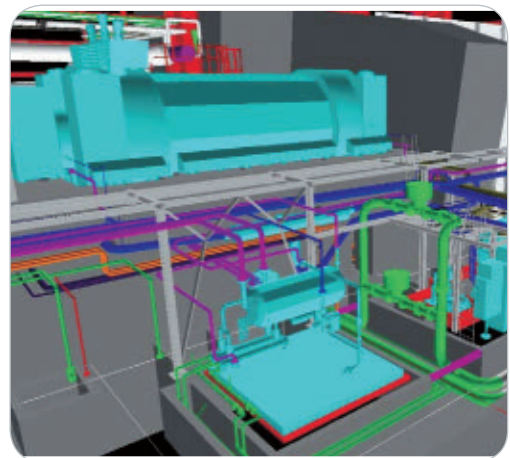
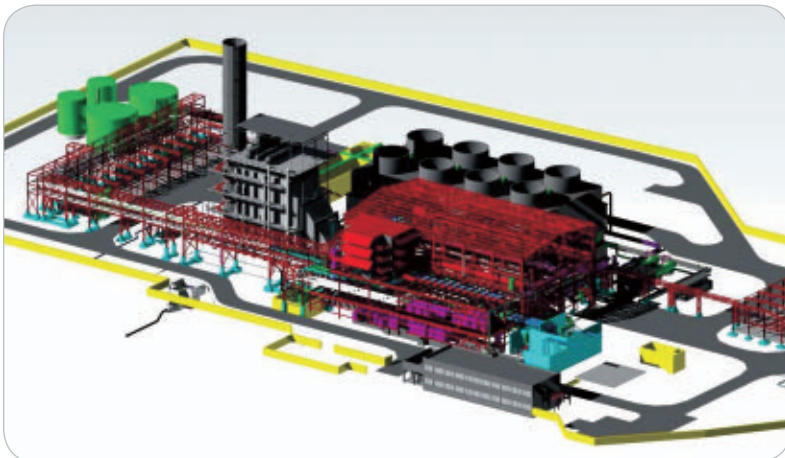
Projenia S.r.l.

**Marcinelle CCGT Power Plant**

Charleroi, Belgium

Located at the Carsid Complex in Charleroi, Belgium, the Marcinelle Energie combined-cycle gas turbine power plant has a design capacity of 410 megawatts. Enel Ingegneria e Innovazione acted as the engineering, procurement, and construction contractor, while Projenia provided engineering design services including preliminary plant layout, mechanical plant and piping detail design, and balance-of-plant instrument positioning.

Projenia created a 3D model of the overall power plant. AutoPLANT and Bentley AutoPIPE were used to achieve a clash-free design and erection-optimized layout. The 3D integrated environment based on Bentley products ensured multi-discipline coordination among engineering teams working from various locations. The 3D integrated design process reduced design time by 10 percent, significantly reduced the erection cost, and improved plant operability by optimizing space for maintenance and safety.





## ENERGY UTILITIES

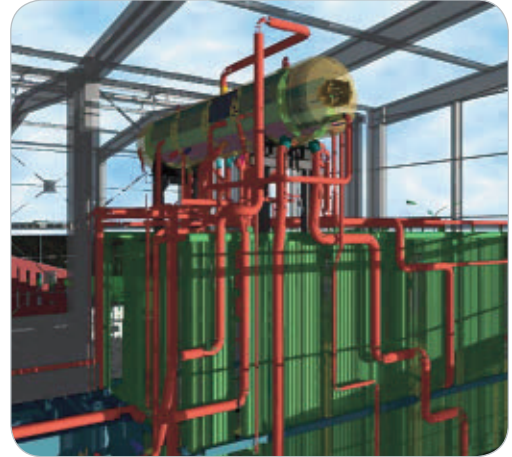
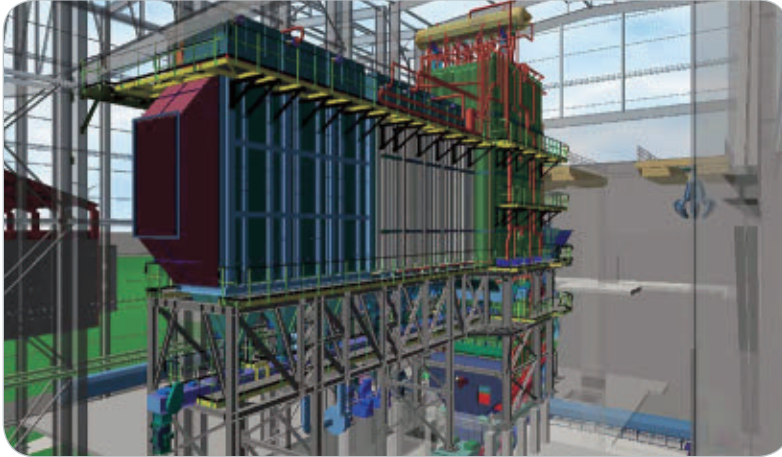
Ruths S.p.A.

### Ferrara Incineration Plant

Ferrara, Italy

This project involves the design, construction, and start-up of a new power generation plant for Hera S.p.A. Fed with municipal solid waste, it takes advantage of advanced technologies to minimize environmental impact and pollution. Using AutoPLANT, Ruths created the project directly in 3D so there is just one drawing for the entire project lifecycle.

The time saved is about one hour for each modification. With an average number of 200 modifications for each project, Ruths is saving about 200 hours per project and its return on investment was 100 percent in one year. Money saved in the power generation plant project from 3D navigation was about USD 20,000.



SMEC

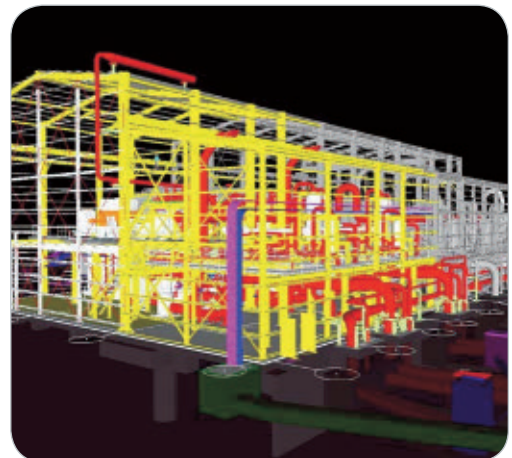
### Lihir Geothermal Power Station

Papua, New Guinea

**FINALIST**

Lihir Gold Limited retained SMEC to add 20-megawatts of capacity to the company's 30-megawatt geothermal power plant. The geothermal plant was one of the first Clean Development Mechanism projects in Papua, New Guinea. Because the work involved an expansion, interfacing with existing structures, piping, and other equipment was critical.

AutoPLANT assisted in resolving potential operational and maintenance interference problems prior to fabrication, saving substantial time on site by avoiding rework. A small team of engineers and a design draftsman located in SMEC's Australian office were able to produce 3D deliverables to fabricators in New Zealand and to Lihir Island efficiently to meet tight deadlines.



2007 FINALIST



**FINALIST**

Southern Company

**Design Application Integration**

Kemper County, Mississippi, United States

Located in Kemper County, Miss., the USD 2.8 billion Plant Ratcliffe project is Southern Company's first foray into clean-coal power generation using transport integrated gasification technology. The 582 megawatt plant is expected to emit 65 percent less carbon dioxide than traditional coal-fired plants. The company leveraged its software to create a fully integrated, managed environment that significantly improved design quality.

AutoPLANT was configured for each engineering discipline, and all models were managed through a controlled workflow in ProjectWise. eB Data Quality Manager enabled efficient asset location and the transfer of approximately 75,000 vendor assets and design information vital to construction, operation, and maintenance. As a result, the startup and commissioning group will save nearly 6,000 man-hours.



2012 FINALIST

**WINNER**

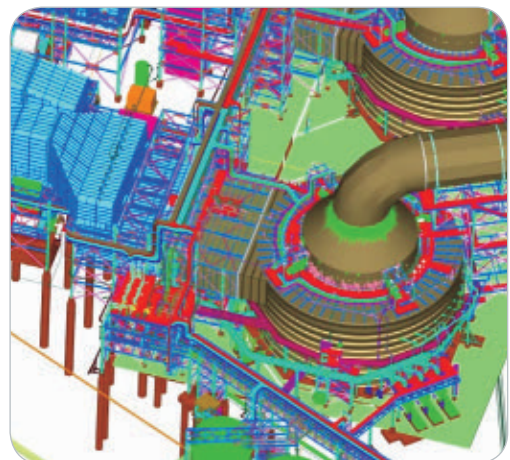
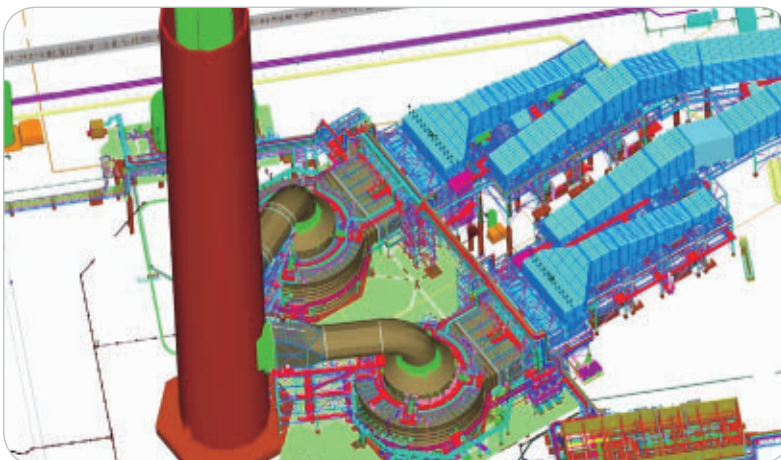
Southern Company

**Plant Wansley Units 1-2 FGD Addition**

Carrollton, Georgia, United States

Plant Wansley in Carrollton, Georgia, has two coal-fired boiler units and two combined cycle gas-fired units. Units 1 and 2 are being retrofitted with one scrubber per unit to significantly reduce sulfur oxides emissions. The major challenge was the completion of the design phase in a compressed schedule while keeping the two power plant units running at all times except for scheduled outages.

Bentley products provided the capability to transfer analytical and geometry models back and forth between STAAD.Pro and Bentley Structural. This, along with the tremendous 3D visualization obtained with TriForma, AutoPLANT, and AutoPLANT Explorer/ID, reduced design time and improved coordination among engineering disciplines by eliminating on-site clashes between equipment, piping, instruments, and structural members.



2007 WINNER

# ENERGY UTILITIES

## Southern Company

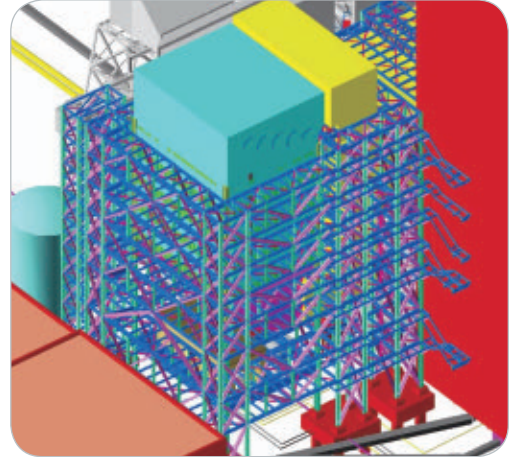
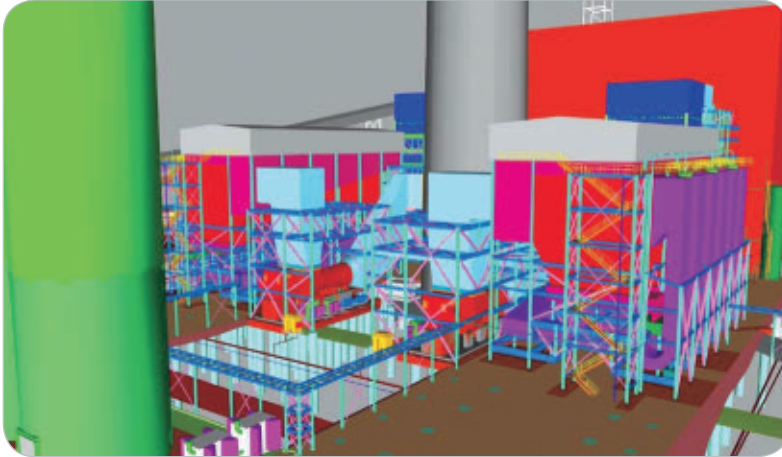
### Plant Yates Units 6 and 7

Newnan, Georgia, United States

**FINALIST**

Southern Company evaluated design options for making Plant Yates Units 6 and 7, located in Newnan, Georgia, more environmentally friendly and less costly to operate. Engineers worked through conceptual designs for installing desulfurization technology vs. converting the units from coal-fired to natural gas. Using ProjectWise with integrated design tools enabled the engineers to compare multiple configurations throughout conceptual design.

ProjectWise was used to manage 3D and 2D content, models, and workflows associated with CAD/CAE tools including Bentley Structural, STAAD.Pro, and AutoPLANT plant engineering design software. With the option to review fully integrated 3D models, the project team evaluated multiple variations of the circulating dry scrubber project, estimated at USD 600 million. Southern Company chose gas conversion, estimated at USD 40 million, as the best option for the plant and customer.



2013 FINALIST

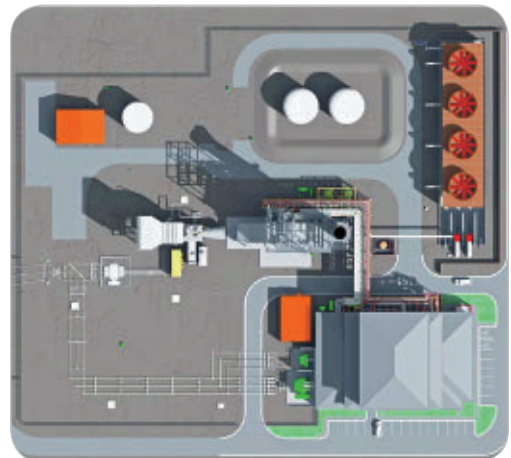
## Stanley Consultants, Inc.

### MMPA Combined Cycle Addition

Faribault, Minnesota, United States

Stanley Consultants provided engineering and design services for a 100-megawatt combined cycle expansion to a 150-megawatt simple cycle Frame 7FA power generation facility. The 250-megawatt Faribault Energy Park, which is owned by the Minnesota Municipal Power Agency, is located adjacent to Faribault, Minnesota.

The firm used AutoPLANT to create the 3D model for collaborative design coordination among the various disciplines. The software was also used to incorporate client preferences, review for multidisciplinary interferences, and procure/manage materials. The project team consisted of groups of engineers and designers divided by discipline and located in multiple offices across the country.





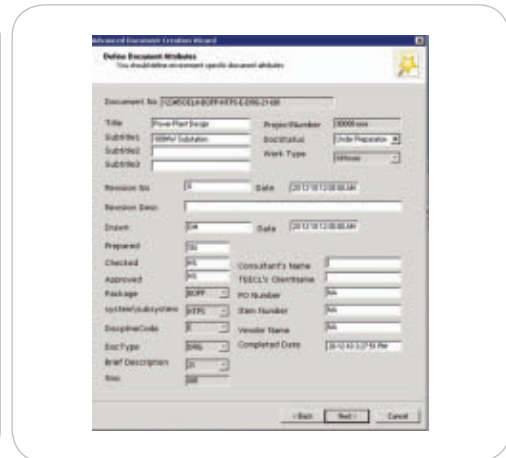
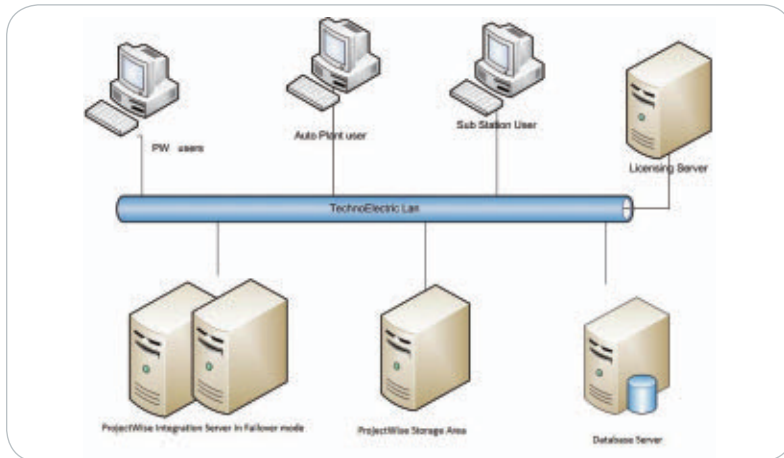
## Techno Electric &amp; Engineering Company Ltd.

## Enhancing the Value of Engineering Information Using ProjectWise

Kolkata, West Bengal, India

As a leading engineering, procurement, and construction services company in India's power sector, Techno Electric & Engineering Co. is responsible in some capacity for about half of India's thermal power generating capacity and a major portion of the national power grid. Prior to implementing ProjectWise, the company managed data from multiple projects on network drives, which caused problems with data maintenance, archiving, and reuse; and document tracking, security, version control, and auditing.

ProjectWise was deployed as a single robust platform and centralized repository to resolve these issues. The system helps users find, reuse, and share project data and makes access control, security permissions, and backup and retrieval more efficient. Application-level integration was deployed with 3D modeling products including AutoPLANT, Bentley Substation, and MicroStation. Techno Electric has achieved 10 percent time savings with ProjectWise workflows.



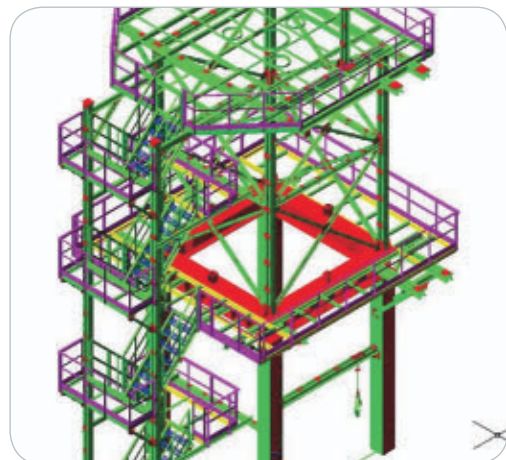
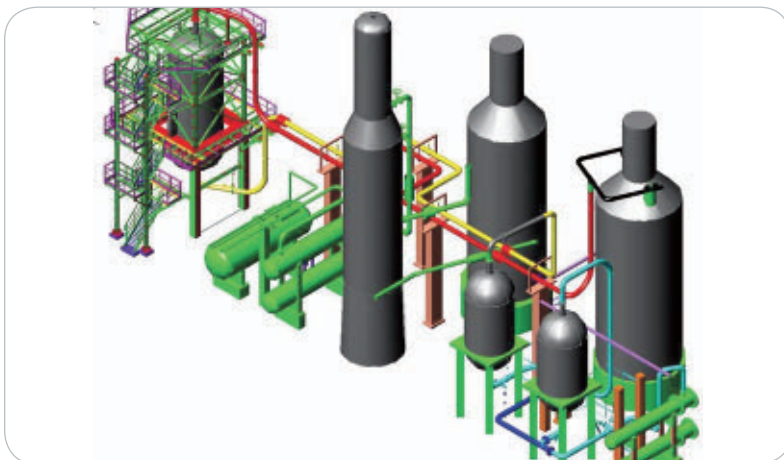
## Ukratnafta

## Unit of Additional Reactor

Kremenchug, Ukraine

Ukratnafta, a Ukrainian oil refining company, installed an additional reactor to improve quality and expand production at the Kremenchug refinery. The project was undertaken at an operating installation in constrained conditions. Design works were conducted in parallel by several departments. To find the most durable design solution for piping, the project team imported the piping model into AutoPIPE to test for resistance under high temperature and pressure.

More than 10 variations of the pipeline configuration were tested, including different configurations of suspension brackets and thicknesses of pipeline walls, and the variant corresponding to the requisite durability conditions was selected. Using AutoPLANT and AutoPIPE enabled Ukratnafta to work simultaneously with several working models and, as a result, choose the best design.



## ENERGY UTILITIES

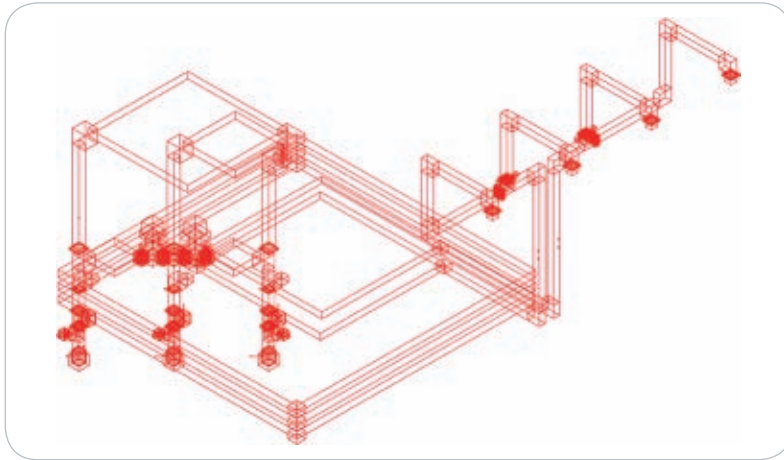
### United Conveyor Corporation (India) Pvt. Ltd.

#### Fly Ash Handling Project

Moundsville, West Virginia, United States

At American Electric Power's Mitchell Plant near Moundsville, West Virginia, United Conveyor Corporation (India) completed an ash handling project using AutoPLANT and Bentley AutoPIPE. The 3D models saved time on this USD 150 million project by visualizing the components used to convey fly ash from its source in the coal-fired power plant to its destination, where it can be recovered for reuse in building and other materials.

UCC India offers state-of-the-art ash handling and pneumatic conveying technology from its parent company, United Conveyor Corporation, USA. The system for this project combined vacuum and pressure conveyance to collect fly ash from hoppers in the electrostatic precipitator area and convey it to a storage silo. Valves in the pipe controlled the flow and distribution of ash and air.



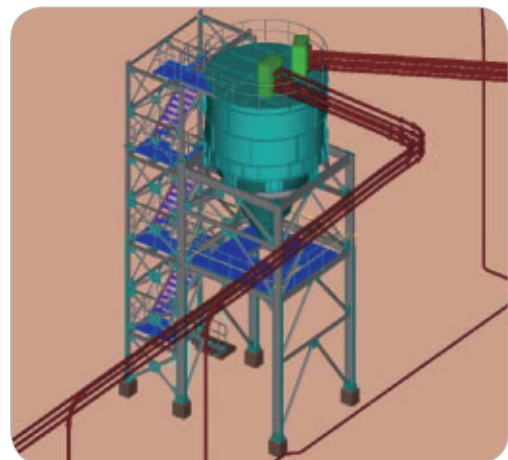
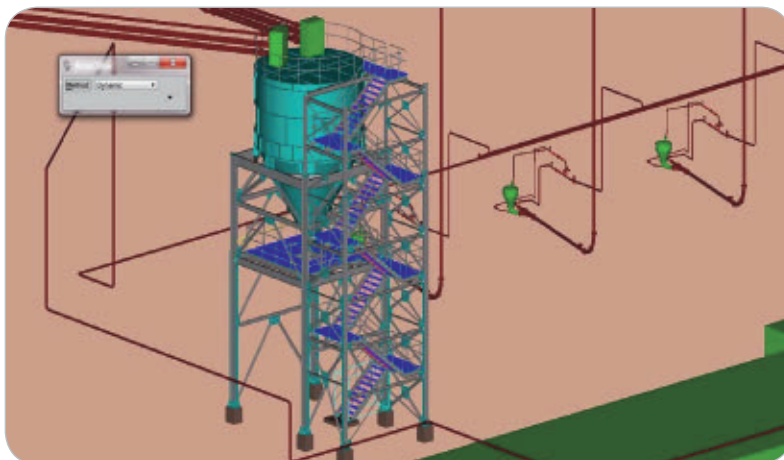
### United Conveyor Corporation (India) Pvt. Ltd.

#### Mill-Reject Handling System – Super Thermal Power Plant

Farakka, India

The 1x500 megawatt super thermal power plant under construction in the state of West Bengal is owned by NTPC, India's largest power company. The prime contractor, Bharat Heavy Electricals, subcontracted United Conveyor Corporation to design the mill-reject handling system. The system conveys coal from the mills to the mill reject bunker. The elevated conveying lines were restricted to a designated corridor.

All structural and piping design work was performed using AutoPLANT and ProStructures. The software helped to economize the designs and detect clashes, reducing construction costs and preventing time overruns on site. Developing a coordinated 3D model, then generating 2D drawings, allowed United Conveyor to stay on schedule. The bills of material extracted from the models helped United Conveyor release material quantities on time.



Y&V Ingeniería y Construcción C.A.

**Jose Plant Turbo Generators**

Anzoategui, Venezuela

Y&V Ingeniería y Construcción developed the detailing for a 232-megawatt power plant at a refinery located in the northeastern region of Venezuela. The main obstacle was to set up the project within a relatively short time frame so that isometrics and plans could be delivered on time. AutoPLANT was used to develop 3D models for piping and equipment, reducing the man-hours required to draft plans and isometrics.

Compared to 2D methods, AutoPLANT reduced the time required for modeling piping and extracting isometrics from 60 man-hours to 40 man-hours. Threedimensional modeling of plant plans took eight man-hours vs. 80 man-hours in 2D. And materials take-offs took four man-hours vs. 14 man-hours in 2D. The margin of error in inventorying and materials checking was also reduced, minimizing related costs.



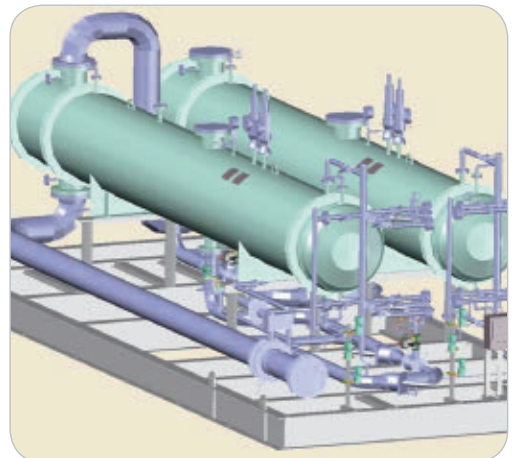
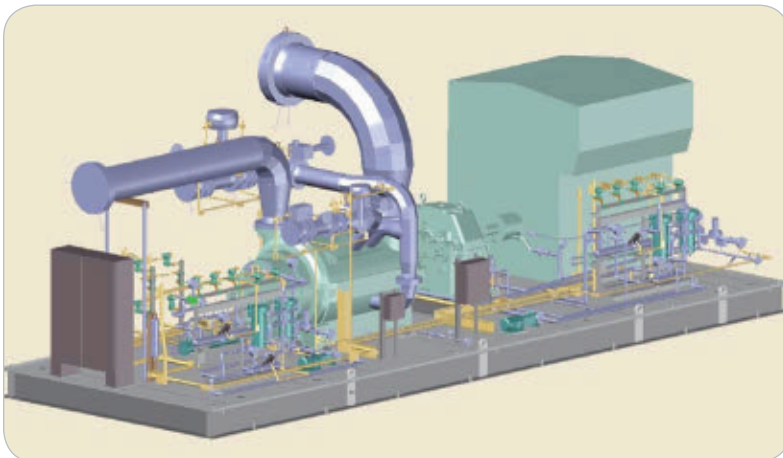
YORK/A Johnson Controls Company

**Duke Energy – IGCC**

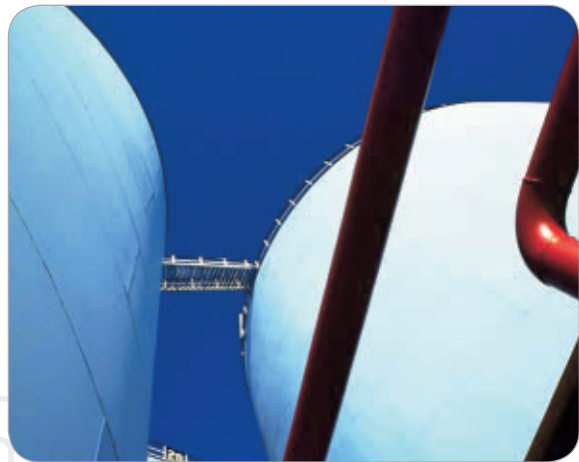
Edwardsport, Indiana, United States

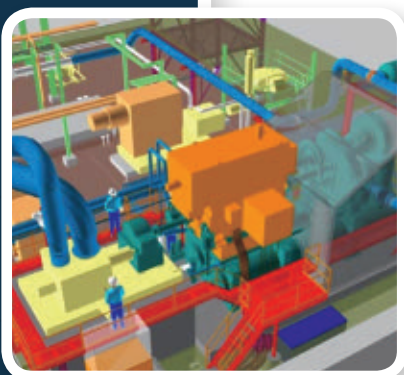
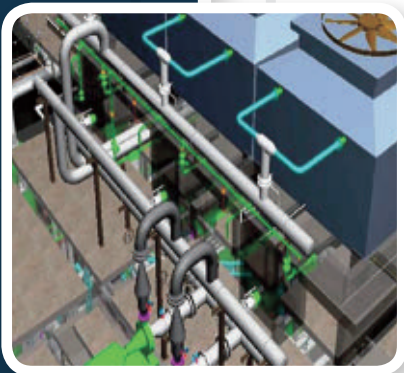
Duke Energy built a cleaner-coal integrated gasification combined cycle plant at its 160-megawatt Edwardsport Station. The 630-megawatt facility will emit less sulfur dioxide, nitrogen oxides, and particulates than the plant it replaces while providing more than 10 times the power. YORK Process Systems is providing three 50 percent YORK M centrifugal compressor refrigeration drivelines along with various heat exchanger and vessel skids.

AutoPLANT Piping and Bentley Navigator were deployed to improve the overall engineering design cycle by imposing a design discipline that resulted in more accurate drawings and bills of materials. The improved workflow efficiencies enabled YORK to spend more time designing equipment, and manufacturing benefited from the improved procurement that comes with design accuracy, detail, and visualization.









# Industrial

These industrial projects show how AutoPLANT helps multidiscipline projects minimize engineering efforts.



# INDUSTRIAL

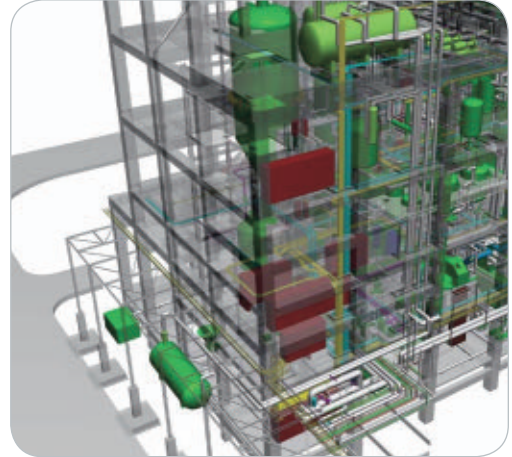
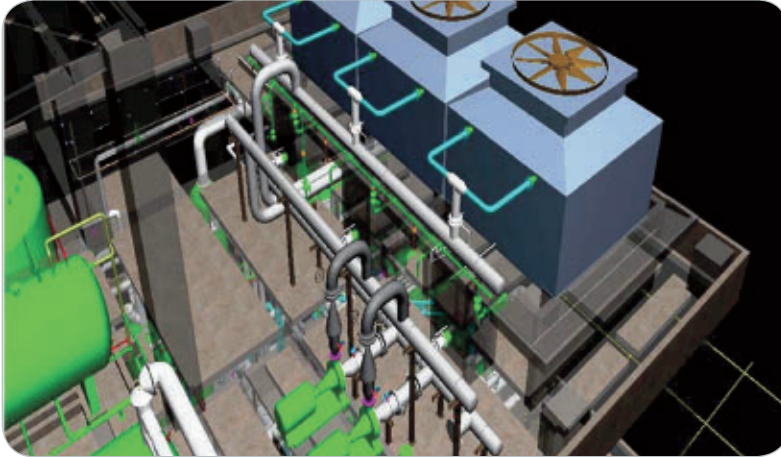
## Ausenco Engineers Pvt. Limited (Ausenco Sandwell)

### Continuous Polymerization Plant

Bajpur, India

Polyplex India set up an 8.7-meter-wide polyester (PET) film line with a continuous process chips plant and metalizer at a new location in Bajpur, India. Ausenco Sandwell developed the 3D model to generate a clash-free piping and equipment layout for the chips plant comprised of 180 to 200 pieces of equipment and 650 lines. The project also called for high-end process conceptualization, piping material specification, and modeling of specialized equipment.

AutoPLANT was used to develop a model meeting all process requirements and extract drawings, isometrics, and bills of quantity. The stress model for critical pipelines analysis was created in AutoPIPE and structural design and detailing was completed using STAAD.Pro and ProSteel. The modeling seamlessly integrated all design groups and contributed to achieving a tight execution schedule with minimum rework.



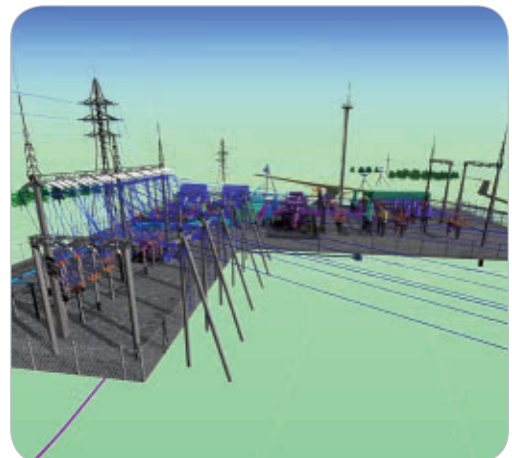
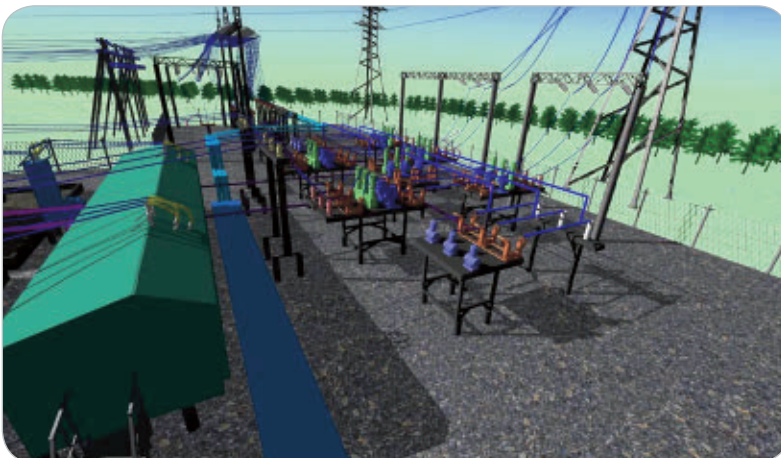
## BashNIPneft

### Trebs Oil Field: Central Collection Point

Naryan-Mar, Russia

Bashneft, one of the largest oil producers in Russia, holds the license for development of the Trebs oil field located in the Arctic region of Nenets Autonomous Okrug. Bashneft's research and development institute, BashNIPneft, a leading research institute in the field of oil and gas exploration, was contracted to execute the Central Collection Point project.

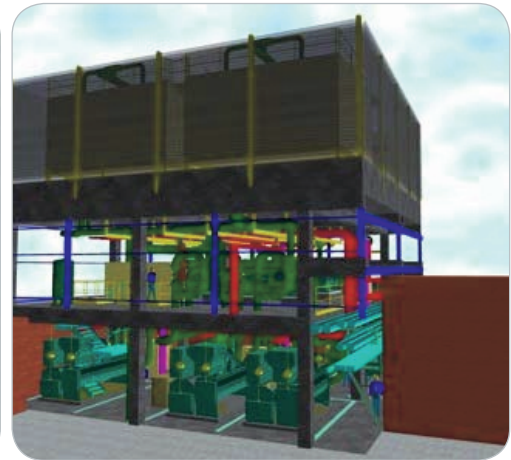
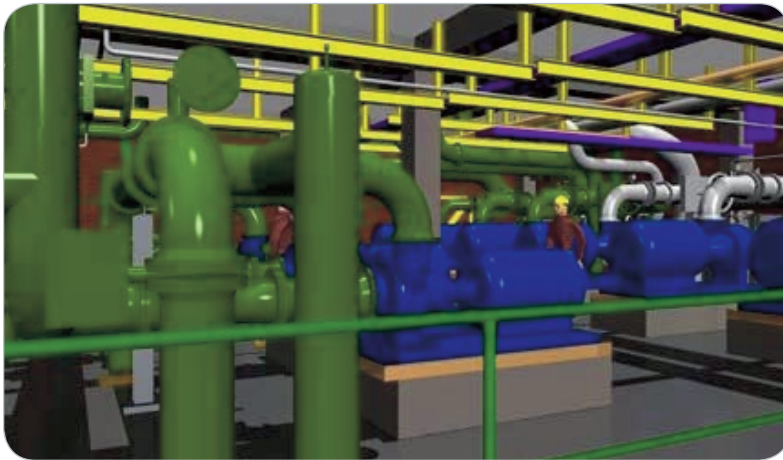
With training and technical support from Bentley's partner in Russia, BashNIPneft implemented AutoPLANT for piping, equipment, and raceways in addition to AutoPIPE, ProStructures, STAAD.Pro, and Bentley Interference Manager. The 3D solutions reduced mistakes, exposed interferences, and expedited the project design and delivery.



**BnS Engineering NV**  
**Cooling Water Plant**  
 Zelzate, Belgium

The project consisted of an upgrade to the existing cooling system of a pharmaceutical plant, which included the installation of two new cooling machines, compressor, cooling towers, 12 pumps, six heat exchangers, interconnecting piping, and a main distribution system on a space of 350 square meters. The installation had to fit in between three existing buildings.

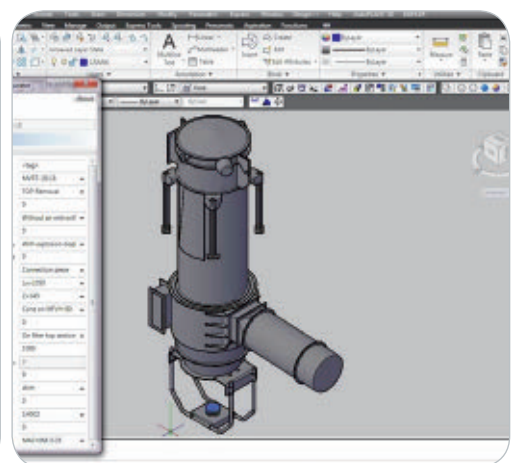
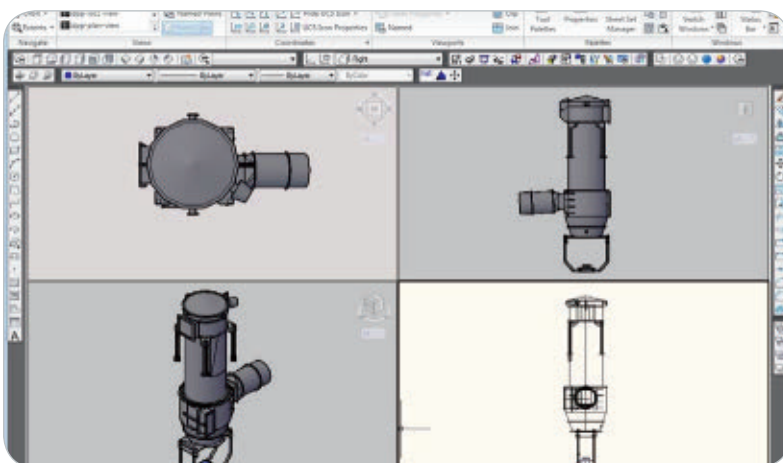
To meet the high demands and guarantee quality, BnS combined AutoPLANT with laser-scan modeling for layout, space management, and piping design. The as-is facility of the existing cooling center was measured with laser scanning and integrated into AutoPLANT, leading to reliable construction and zero clashes with the existing installation.



**Buhler AG**  
**Equipment Configurator**  
 Uzwil, Switzerland

Buhler is a specialist and technology partner for plant, equipment, and related services for food processing and materials manufacturing. The Grain Milling business unit developed the Equipment Configurator (EqC) to replace a paper-based process that relied on the knowledge of the designers. The 3D model configuration tool introduces standardization, accelerates design, minimizes mistakes, and provides a reproducible approach.

Based on custom software developed by Bentley, EqC includes functions to assemble AutoCAD blocks into AutoPLANT, add nozzle information, and convert the assembly into an AutoPLANT Equipment model. Bentley Design++ rules for the 120 most important machines translate engineering knowledge into Lisp. Developed for USD 200,000, the tool reduces the time to configure machines by one half. Configuring 5,000 machines per year, total savings are significant.



# INDUSTRIAL

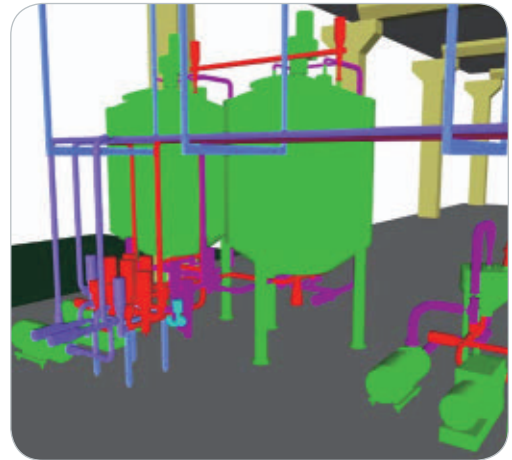
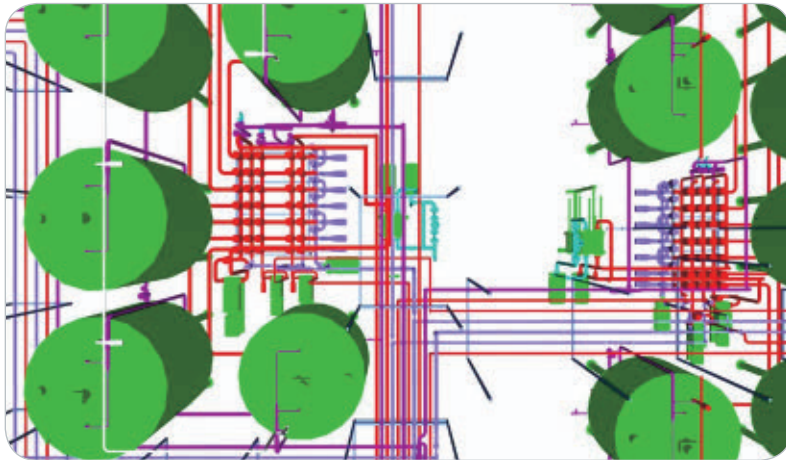
## Cadem Services

### Galkatika, Gutchina

Gutchina, Russia

The primary goal of this project was to engineer the piping for a milk processing plant supported by Valo Dairy of Finland in the Russian town of Gutchina. Cadem Services needed a solution that supported SMP valves and SRC valves and could be deployed remotely.

Though the Cadem team evaluated several piping engineering products, it found only Bentley software gave it the necessary multiport sanitary valves and fittings support to complete the project successfully. Cadem was able to complete the design from its offices in India using AutoPLANT and AutoPLANT Piping.



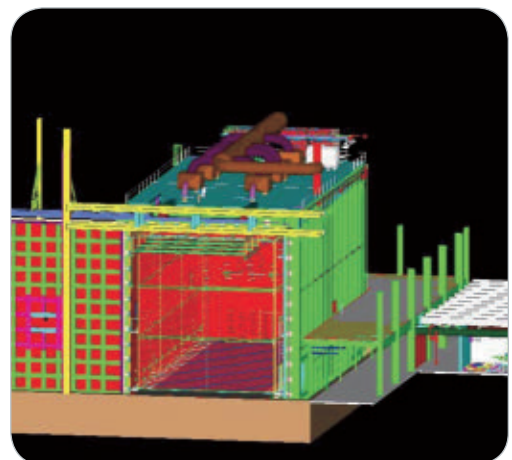
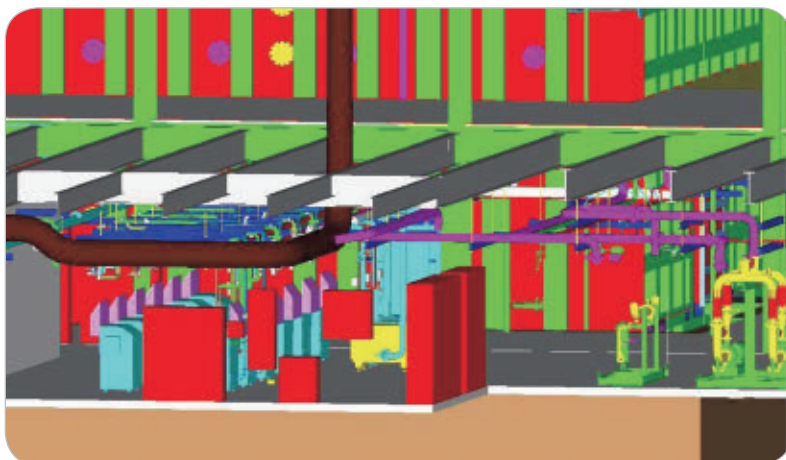
## Chart Energy & Chemicals

### USD 50 Million Vacuum Chamber for the Aerospace Industry

Garfield Heights, Ohio, United States

A vacuum chamber is primarily used to simulate the vacuum of space and to calibrate satellites. The dimensions of this new vacuum chamber are 48 by 55 by 86 feet, including a huge sliding door, and most of the chamber walls will be fabricated out of 304 stainless steel. Locating and buying stainless steel at current market prices can be costly if not planned and purchased efficiently.

Using Bentley software to create the preliminary 3D steel model, Chart Energy & Chemicals was able to extract all the steel material and bought it by the pound instead of by the plate. The company also saved on materials for the thermal shrouds for the vacuum chamber. It modeled the shroud using AutoPLANT Piping and extracted a bill of materials to keep the overall cost of 5083 aluminum to a minimum.





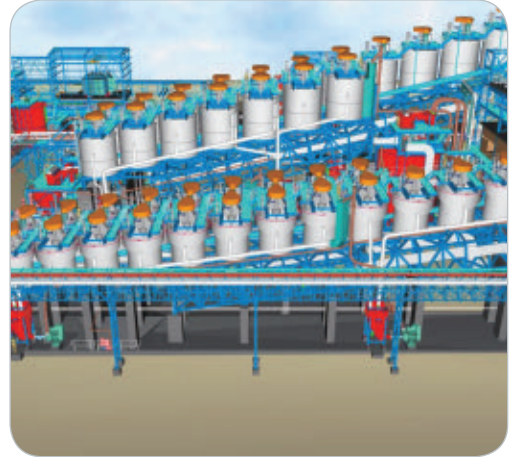
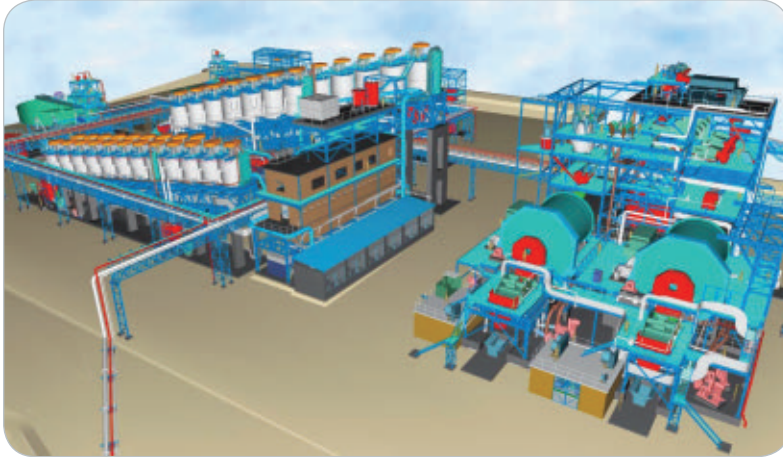
Dowding Reynard &amp; Associates (Pty) Ltd.

**Everest South Platinum Mine**

Lydenburg, South Africa

Dowding Reynard & Associates designed a technologically advanced recovery plant in Africa that includes a primary crusher. The design team used AutoPLANT to generate 772 isometric lines and arrangement drawings of 854 tons of structural steel. Both 2D and 3D CAD models were created in conjunction with a project database, which allowed the firm to extract bills of material.

In addition, the production of annotated 2D drawings and piping isometrics was an important factor in helping Dowding Reynard achieve its project deadlines. Bentley Explorer enabled the firm to conduct regular multidisciplinary review sessions during which the project was accurately visualized. Moreover, the application's clash detection system enabled the engineers to eliminate problems at the design stage.



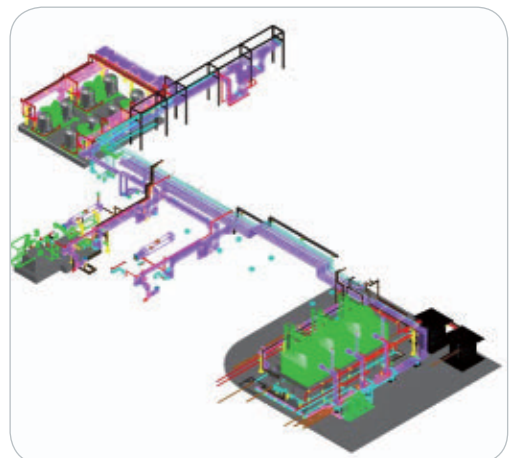
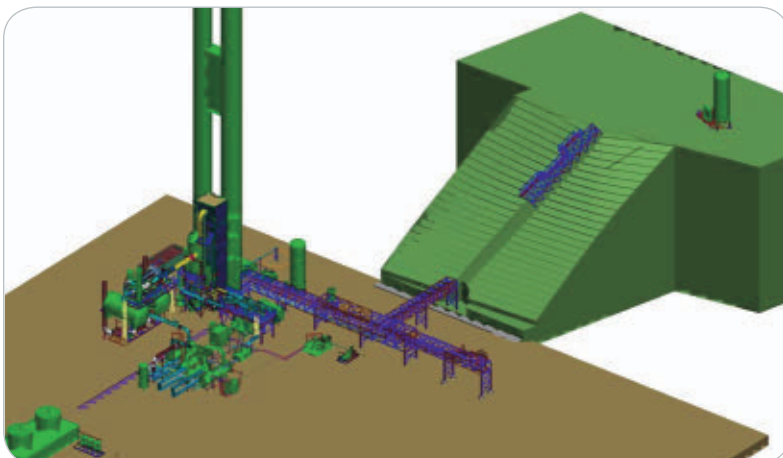
Engenharia Projeto Consultoria S/A

**3D New Technology Implementation Methodology**

Belo Horizonte, Brazil

When a customer awarded a new project to design an air processing unit and recommended Bentley software as the 3D modeling solution, Engenharia Projeto Consultoria (EPC) seized the opportunity to introduce new technology into the engineering and design workflow. Bentley's open standards and the ability to interoperate with other systems was a key factor in the decision.

The project automation team designated an AutoPLANT super user for each discipline and then EPC's 3D design methodology was adapted to become more efficient. The new project defined how AutoPLANT, ProjectWise, ProStructures, and Bentley i-models would be used, and application of the new tools increased productivity, reduced rework, and improved customer interactions.



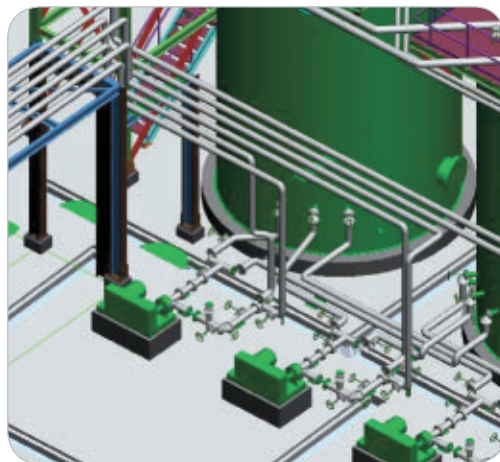
FLSmidth Pvt. Ltd.

## 1.5 Million TPA Alumina Plant – Mud Washing Package

Rayagada, Odisha, India

FLSmidth designed the USD 1.65 million Mud Washing Package for Utkal Alumina's million-ton-per-annum alumina plant in Rayagada, Odisha, India. The area will wash and recover residual caustics before sending mud solids to a disposal pump. The challenge was to fit the pipes, pumps, and tanks within a constrained space while satisfying engineering requirements, maintaining safety standards, and ensuring accessibility.

Working with Bentley products for the first time, FLSmidth found that AutoPLANT was the most efficient tool for integrating disciplines including civil, piping, and equipment. The 3D modeling of components enabled the project team to resolve proactively any issues with clearances, contact, and clashes. The improved accuracy significantly reduced the lead time needed to produce the complete 3D model, 2D layouts, isometrics, and materials take-offs.



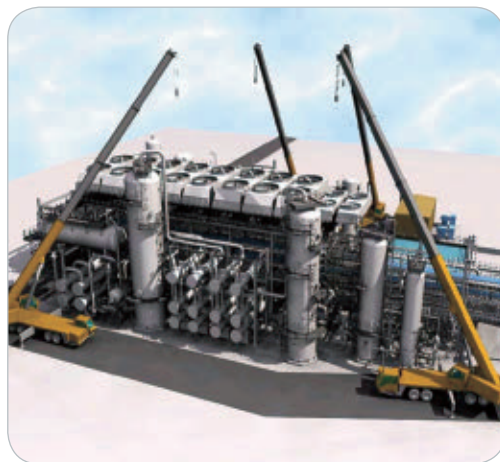
Ford, Bacon & Davis, Inc.

## Rose Unit

Meraux, Louisiana, United States

The Rose Unit USD 52 million reconstruction project in Meraux, La., took 14 months to complete. This fast-tracked project involved large bore thick-wall pipe, jacketed pipe, and very high temperatures. In addition, the software used needed to interoperate with Caesar II pipe stress analysis.

Using AutoPLANT, the project team was introduced to 3D modeling. The plant's stress analysis duration improved by at least 50 percent, and the ability to seamlessly transfer piping in the model to stress engineers and back again saved man-hours. Total time saved on the project was six months, which translated into USD 20 million in additional production that would otherwise have been lost.

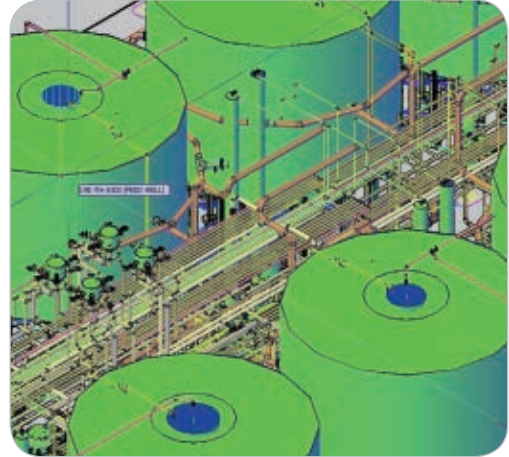
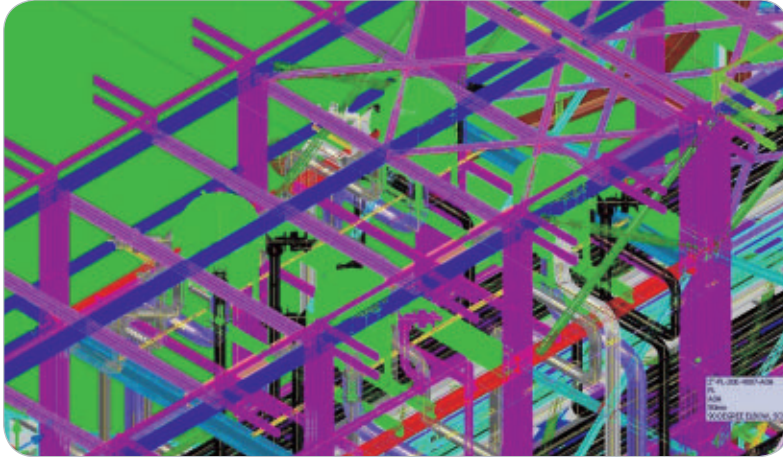




HDO Technologies Limited  
**Vedanta Settler and Washer**  
 Orissa, India

Located in Orissa, India, HDO Technologies was a relatively new user of AutoPLANT when project team members were tasked with isometric generation and material take-off estimation for the Vedanta Aluminium Settler and Washer. The total number of lines involved in the project was 809, with 600 isometrics extracted and 163,409 inch meters as pipe material take-off.

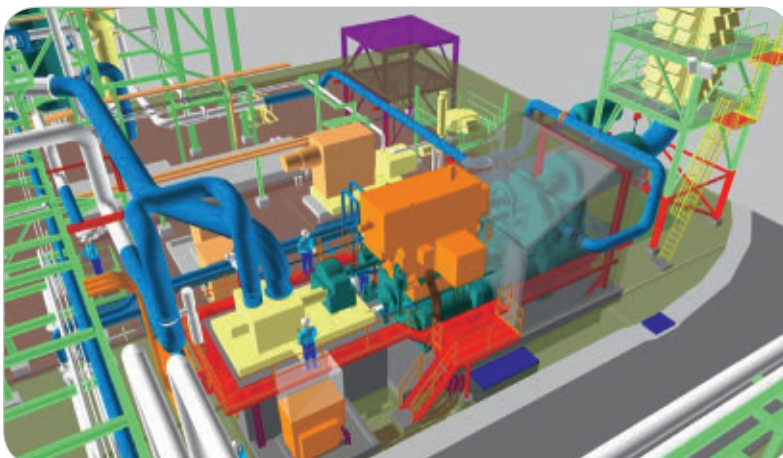
AutoPLANT benefited the project by saving significant time. Bentley's flexible licensing enabled HDO Technologies team members to work concurrently, which also helped to reduce man-hours. With the help of Bentley products, the firm now has better coordination among various disciplines and a more coordinated flow of information.



KBR  
**Yarwun 2005 Uprate**  
 Queensland, Australia

Orica Limited's Yarwun plant manufactures explosives for the mining industry in Australia. KBR was engaged to produce detailed documentation for the manufacture and installation of new equipment of a larger capacity and size, and larger piping systems required for the upgrade of two nitric acid plants and the plant cooling water system to be installed within plant areas with minimum access space and had already undergone upgrade projects.

Orica and KBR jointly decided to use KBR's 3D plant modeling capability, and KBR elected to use AutoPLANT, which made it possible for the 3D modeling work, layout, and piping design to be undertaken by one piping designer. The 3D visualization technology enabled parties within the project team to communicate and review various aspects of the project from their base locations, which included the client's project and site offices and KBR's design office.



# INDUSTRIAL

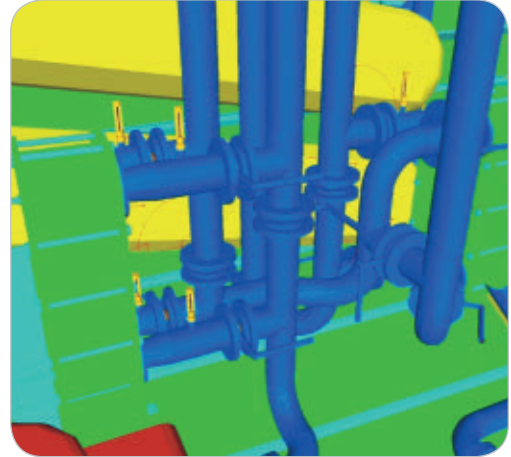
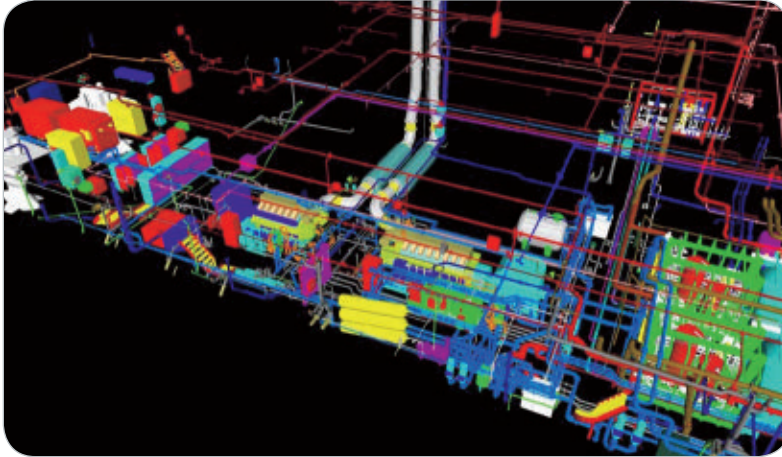
## LMG Marine AS

### Gas Ferry

Bergin, Norway

Norwegian authorities had five natural-gas-powered car ferries built to expedite commuter crossings on the Norwegian Fjords. The new ferries will have twice the car-carrying capacity of existing units, move faster, pollute less, and are more comfortable. They each can accommodate 212 automobiles and have seats for 584 passengers.

LMG Marine wanted to get the detail production drawing completed early since the hull and superstructure were being constructed remotely in Romania. The 3D models were created using AutoPLANT and then precise pipe drawings were generated, enabling the pipes to be prefabricated and galvanized in advance. A number of the pipes were made in Norway and shipped to the outfitting yard, awaiting installation once the hull arrived.



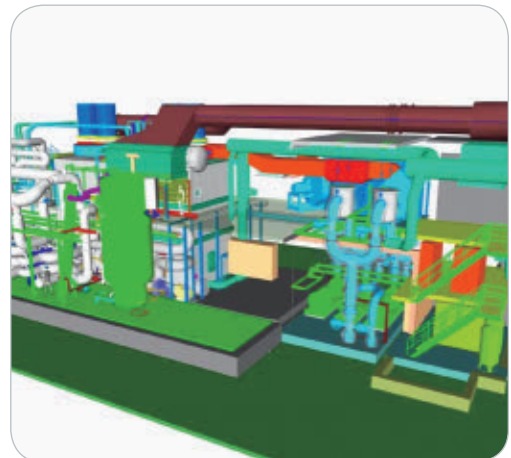
## Norsk Energi

### Hoff District Heating Central

Oslo, Norway

This project involves the installation of as much new heating capacity as possible in an historical building operated by Hoff Heating Central in Oslo, Norway. The detailed engineering and building of the plant had to be completed within 18 months, during which all internal structures had to be removed but the facades kept intact. Also, new structures had to be erected and new equipment had to be installed.

Norsk Energi used AutoPLANT for detailed engineering and construction and AutoPIPE for pipe stress calculations, which made it possible to reduce man-hours in design and engineering of the plant. The ability to share 3D information during the design enabled the software to not only act as a design tool, but also as a communication and discussion tool. This resulted in better quality, from the design phase to the end product, and reduced both engineering and manufacturing costs.

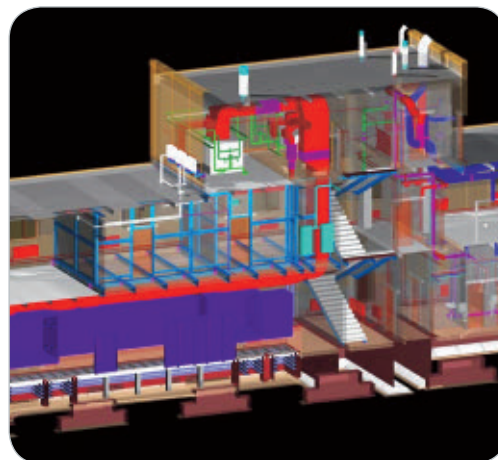
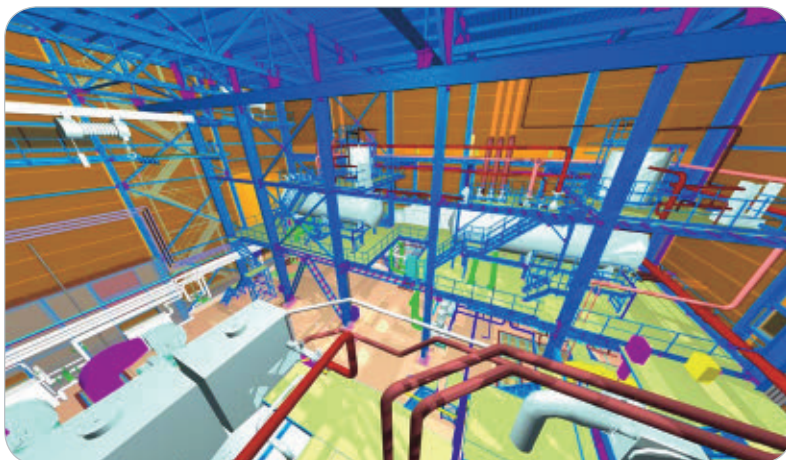




OJSC Magnitogorsk Giprometz  
**Hot Rolling Mill's Boiler Room**  
 Magnitogorsk, Russia

OJSC Magnitogorsk Giprometz has a 72-year history as general designer for Magnitogorsk Iron and Steel Works in Russia's Chelyabinsk region. The traditional 2D design company conducted a pilot project in 3D design of a hot rolling mill boiler room to improve design speed and quality while reducing mistakes. Bentley 3D solutions were adopted for the parts most widely present in the company's work.

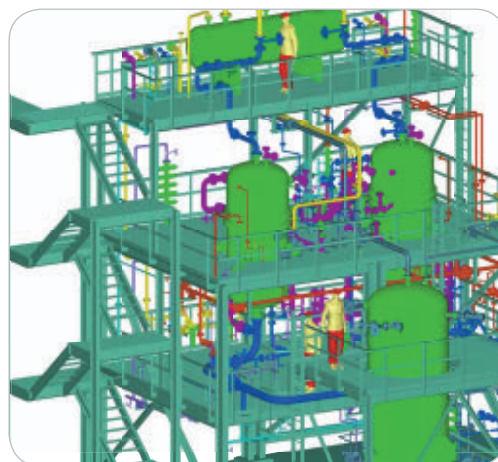
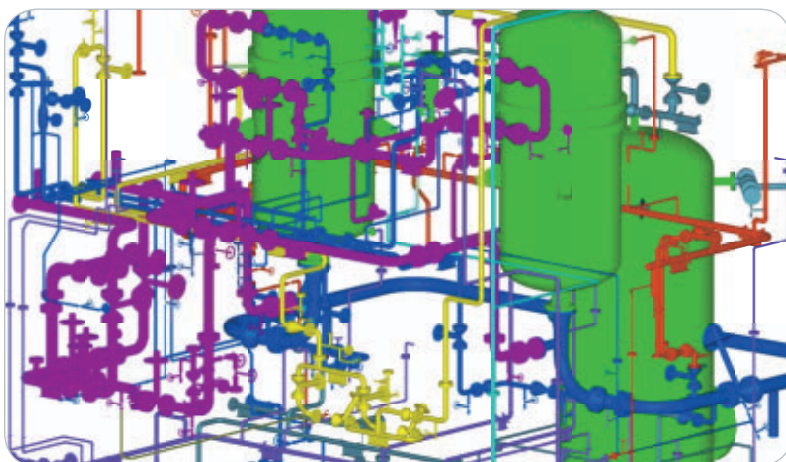
Bentley Raceway and Cable Management provided automated cable routing, exact cable lengths, and accurate material quantities. The company modified Bentley Raceway and Cable Management catalogs to include equipment widely used in Russia. AutoPLANT Piping was used to design boiler room pipelines, with input from the database of Russian distributors. The RUB 105.9 million project revealed the advantages of using 3D design to minimize errors and obtain exact material counts.



Pall India Pvt Ltd  
**Slurry Oil Backwash Filter System**  
 Incheon, South Korea

Pall is a global leader in filtration and purification system technologies. This project was to provide a filtration station for the Incheon oil plant in South Korea. The filter system processes sluggish oil to remove solid particles and water before sending the oil for further processing. The filtered water is then recycled.

The designers saved time by using deliverables and built-in libraries from AutoPLANT modules. During design reviews, the 3D model generated from AutoPLANT enabled the customer to see the details and suggest modifications. These more efficient processes cut the design time in half and enabled the team to deliver error-free reports.



# INDUSTRIAL

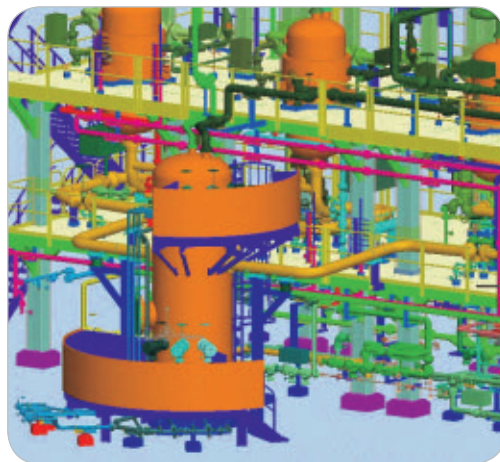
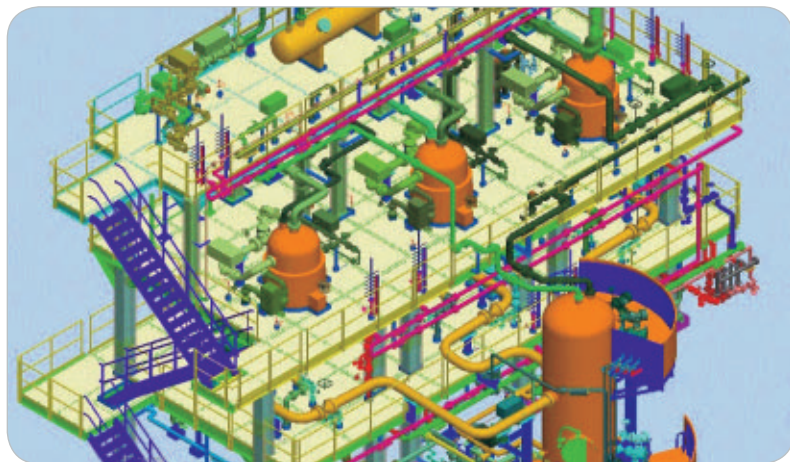
Pall India Pvt. Ltd.

## Slurry Oil Backwash Filter System

Yeosu, South Korea

A global leader in filtration and purification systems, Pall India provided a USD 5.5 million filtration station for an oil plant in Yeosu, South Korea. The filtration system removes solids and water from sluggish oil before it is further processed. Filtered water is recycled. Using AutoPLANT's built-in libraries saved time during design. Other time-saving tools included ProStructures, Bentley i-models, and Bentley Navigator.

During design review, the 3D model generated from AutoPLANT enabled the client to see the design details and suggest modifications. This more efficient process cut design time in half compared to previous projects completed without Bentley software. In addition, the project team was able to deliver error-free reports and hand over the 3D model and 2D drawing to the fabricator.



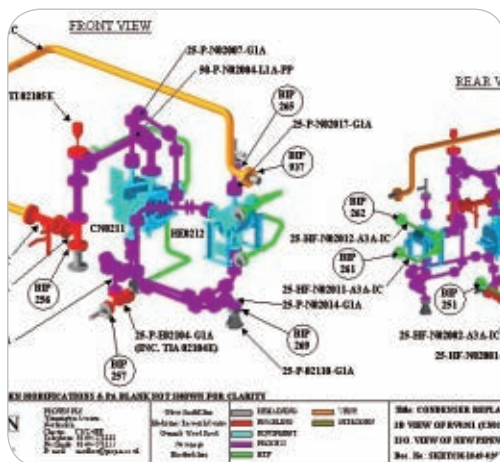
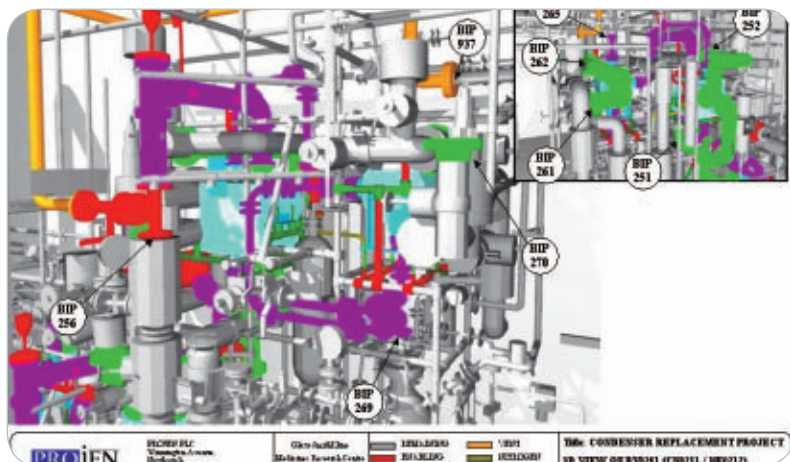
Projen

## Glass Condenser Replacement

Stevenage, United Kingdom

Projen's GlaxoSmithKline condenser project involved the replacement of 40 12-year-old glass condensers tightly housed in nine chemistry pilot plant (CPP) modules at the R&D center in Stevenage, Hertfordshire. The replacements are made of a safer, more robust metal design to ensure the continued production of new chemicals. The CPP modules represent more than half of the worldwide pilot plant capacity used to supply drugs for clinical trials.

The existing piping and layout arrangement in the modules is complex, space is at a premium, and a lot of equipment and piping had to be temporarily moved. A photogrammetric approach was employed to develop 3D models of the modules using dedicated software and AutoPLANT. The model has been shown to be accurate to within a few millimeters, minimizing rework of pipe spools and components.





RMF Engineering, Inc.  
**New OSU Chilled Water Plants**  
 Columbus, Ohio, United States

As part of Ohio State University Medical Center's USD 1 billion expansion, two new central chiller plants are being built to provide chilled water for air conditioning. The USD 51 million South Plant will initially produce a firm capacity of 12,500 tons of chilled water. The USD 32 million East Plant will provide 15,000 tons. Together, the plants represent over 130 pieces of rotating machinery, 70,000 feet of process piping, and 11,000 feet of conduit.

AutoPLANT allowed the design team to optimize configuration of heavy machinery, piping, and wiring to ensure adequate clearances for construction, serviceability, and replacement. Time spent customizing the mechanical and electrical component specification database for the South Plant was recouped on the East Plant, improving the schedule by two months.

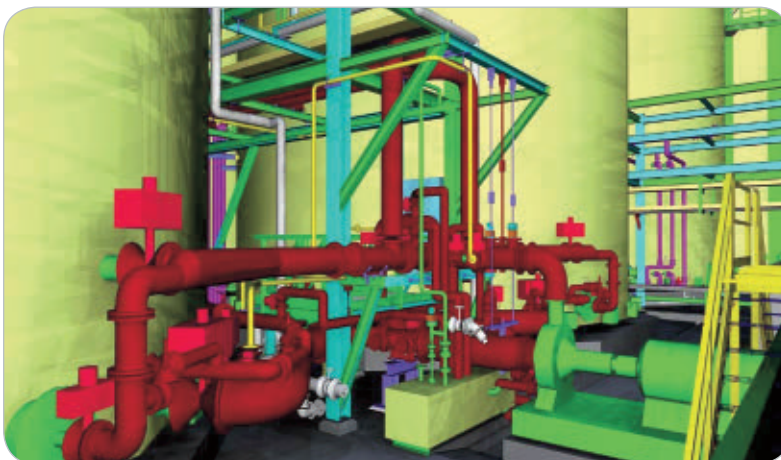


**FINALIST**

Royal Haskoning Industrial Engineering  
**Vopak Tank Terminal Expansion Project**  
 Rotterdam, Netherlands

Royal Haskoning Industrial Engineering designed the tank storage and distribution system for a USD 60 million expansion of the Vopak Tank Terminal in South Holland. The project involved detailed engineering of the utility system; pipe racks for process, utility, and distribution lines; cable trays and instrumentation panel; and platforms for operation and maintenance. 3D laser scanning was used to compile exact as-built data of the existing plan.

Teams in India and the Netherlands started design and modeling of different areas simultaneously. The 3D models developed using AutoPLANT, ProSteel, and STAAD.Pro were accurate, and Interference Manager facilitated the smooth integration of models developed in both locations. The integrated 3D models facilitated smooth execution in the construction phase.





# INDUSTRIAL

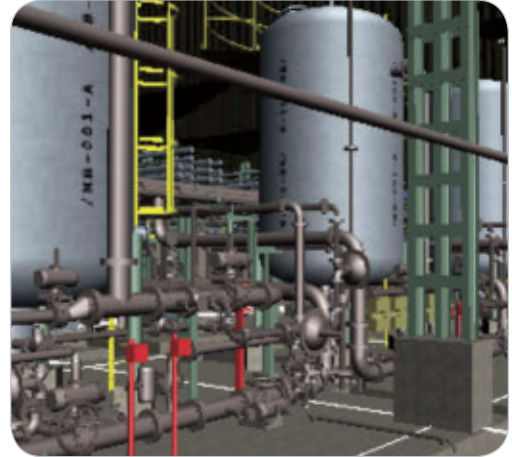
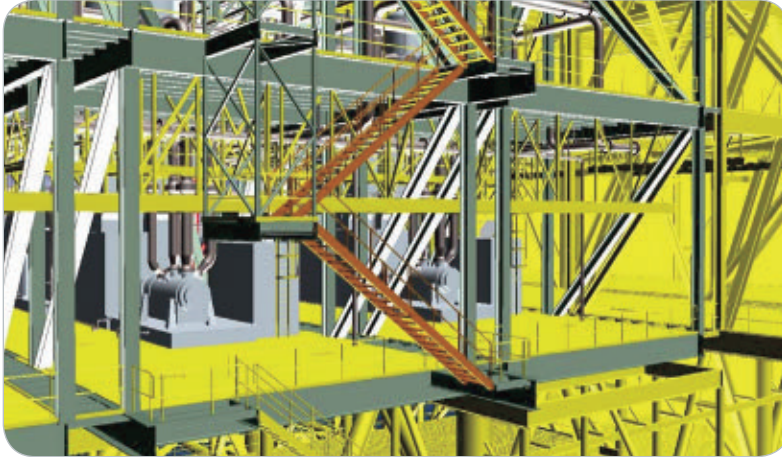
Saankhya TechNeering Private Limited

## Industrial Structures

Bangalore, India

This multifaceted project involved designing several industrial structures, including a coal drying unit, acid recovery plant, and refractory shed. The primary challenge facing the design team was finding an alternative to manual drawing methods for multiple load parameter and design iterations when performing client-requested changes.

Using STAAD.Pro, load data and foundation design parameters for various units were compiled. The structural frames were then analyzed for seismic load bearings. Using AutoPLANT, engineers developed the steel members and produced shop drawings of the layout beams, columns, and bracings based on customer specifications. Bentley software saved approximately 25 percent man-hours over the course of the design.



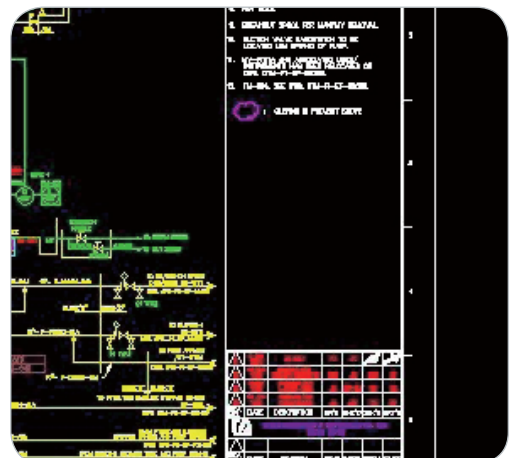
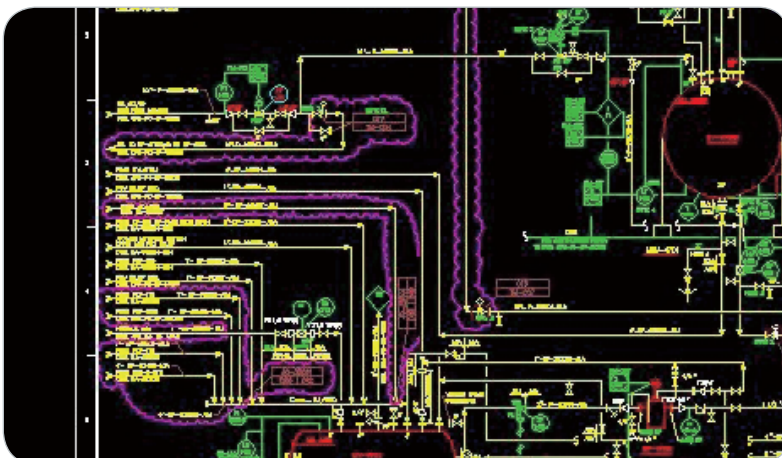
## SABIC

### Polyethylene Project

Jubail, Saudi Arabia

The design of a new USD 1.5 million petrochemical plant to produce polyethylene in Jubail Industry City, Saudi Arabia, involved 15 team members. Because the number of document transfers exceeded the functionality of the system, transporting document folders and drawing information across the project team became complicated. The project team deployed ProjectWise as the collaboration server and implemented AutoPLANT to create intelligent 2D and 3D drawings.

ProjectWise allowed plant engineers to find and verify data quickly without producing hard copies, and its data sharing and exchange capabilities ensured the delivery of required information to the right team member when needed. Visualizations produced by AutoPLANT software enabled the project team to fully manage project transmittals and deliver the project within the given time frame.



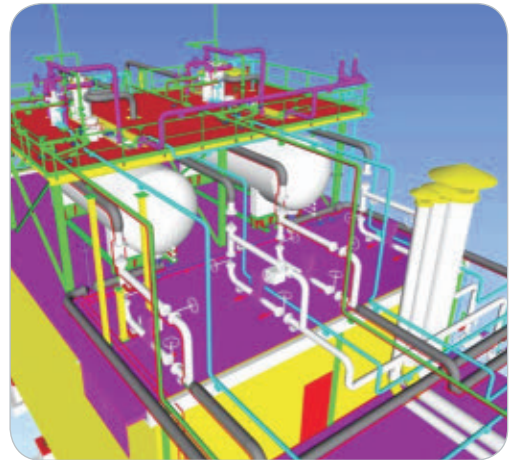
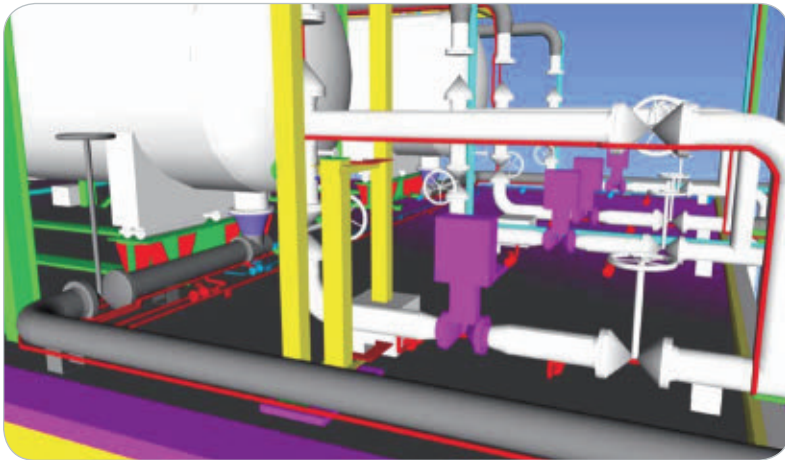
## SHPP

## Installation De-Aeration. Type 133

Kazan, Russia

The goal of SHPP's USD 400,000 installation de-aeration project in Kazan, Russia, was to perform an analysis to determine the best equipment placement and building construction alternative. SHPP also wanted to sustain clear communications throughout the process and release drawings of a technological part of the project.

Using AutoPLANT and ProSteel, the company created unified 3D models for the analysis of architecture, steel construction, electrical, instrumentation and automation, HVAC, water supply, and sewerage. SHPP reduced the time it would normally take for design and also decreased the quantity of errors. SHPP relied on collaboration technology to generate rules for working together with engineers who were using a different program.



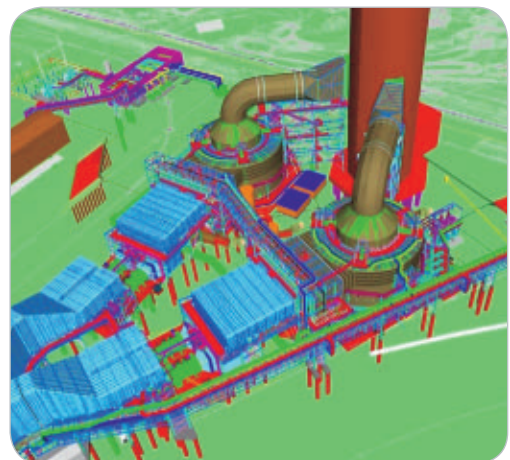
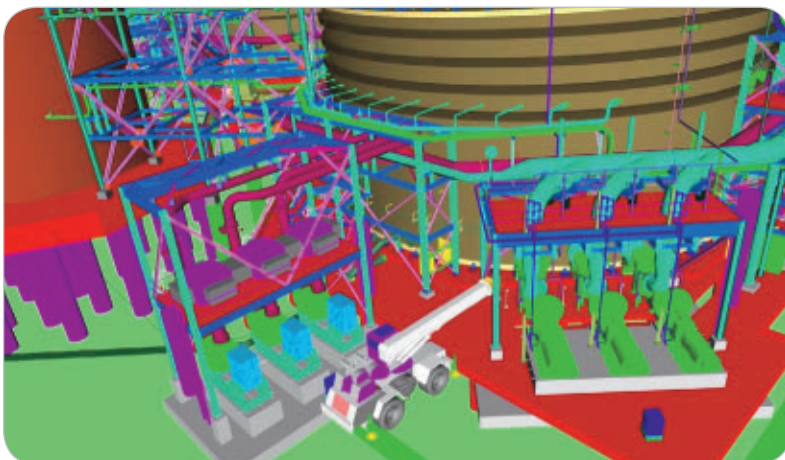
## Southern Company

## Environmental Projects – Scrubbers

Southeast United States

In an effort to promote cleaner air in Alabama, Georgia, Florida, and Mississippi, Southern Company installed scrubbers to remove sulfur dioxide from the flue gas at several coal-fired generating units in the company's system. The scrubbers remove sulfur dioxide and reduce emissions to negligible amounts through a chemical reaction that generates gypsum as a by-product.

The project team implemented an integrated design approach to install the scrubbers and keep the focus on safety, reliability, and cost. This helped overcome the challenges of working around plant outages and managing resources of the simultaneous projects. Through the use of STAAD.Pro, Bentley Structural, and AutoPLANT, the team reduced rework that resulted from interferences and increased overall design efficiency.





# INDUSTRIAL

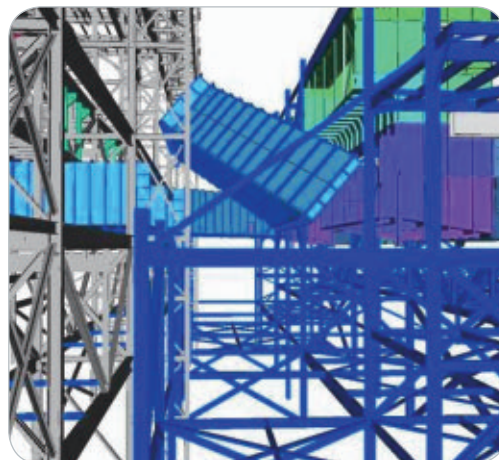
## Southern Company

### Plant Gaston Unit 5 SCR

Birmingham, Alabama, United States

Two selective catalytic reduction (SCR) reaction boxes are being added to Plant Gaston's Unit 5 coal-fired boiler in Alabama. The project involved studying options for erecting a 50-ton section of steel ductwork 52 feet long, 45 feet wide, and 18 feet high in an extremely tight space. The engineering team had to determine if the various options were constructable and economical, and if it could avoid temporarily removing existing or previously erected structural steel.

Southern Company used AutoPLANT and Bentley Navigator software to bring in all working files from the engineering model created with TriForma for design drawing production. A simulation of construction sequences was created in three days. Using the TriForma file, the company also studied the constructability of Duct 5-B erection. Two dynamic animation options were created, passed interference detection, and were sent to construction field for discussion.



## Tessenderlo Group

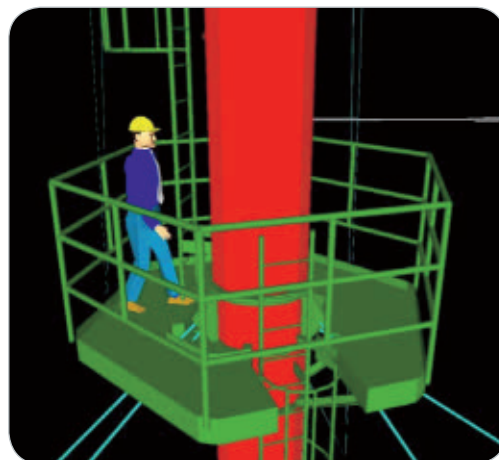
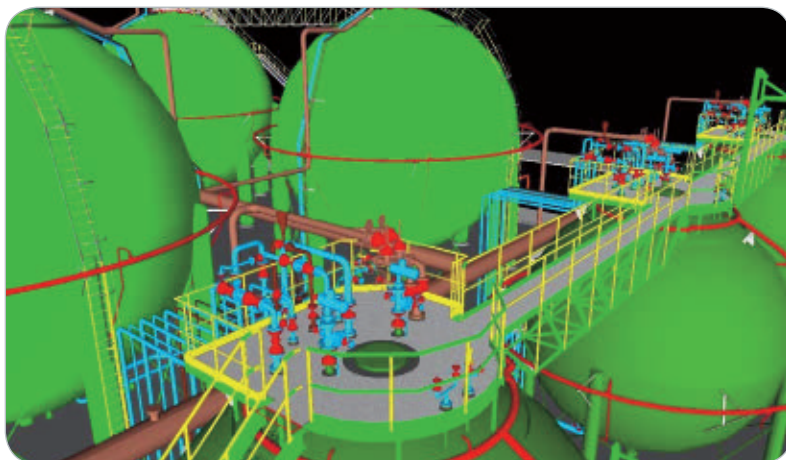
### AutoPLANT/PIDA/eDM System for Engineering and Maintenance Purposes

Brussels, Belgium

**WINNER**

The goal of this Tessenderlo Group project was to centralize and connect all plant information from several sites across several countries, making the information available throughout the group and eliminating redundant data. The central database enables engineers to automatically generate design views, generate isometric drawings, and create material lists and their associated documentation.

Tessenderlo Group developed an interface called PIDA on top of its AutoPLANT database to create bidirectional links among design drawings, data, and project documents. Information originating from the previous CAD system is systematically converted with AutoPLANT's conversion toolkit. By querying any piece of equipment or instrument in the 3D AutoPLANT design review model, all technical data and documents of the component are displayed.



2007 WINNER



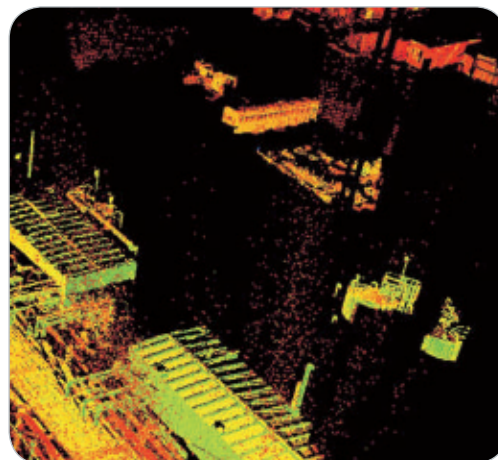
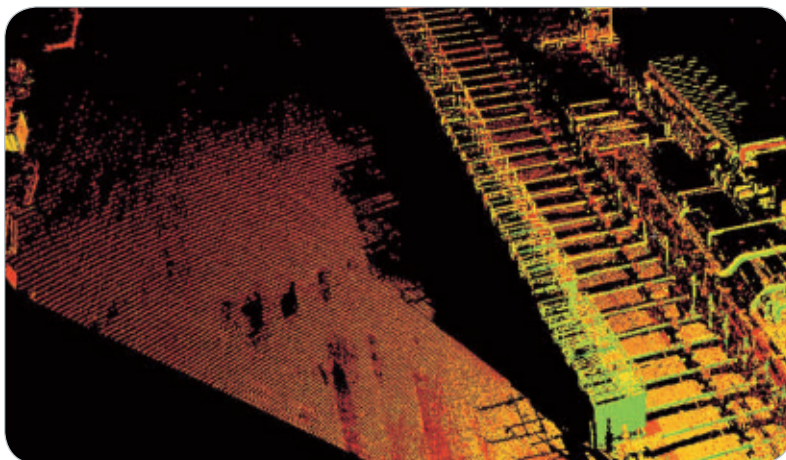
VECO

**ConocoPhillips Drill-Site Technologies**

Barrow, Alaska, United States

The VECO Alaska design team simultaneously engineered drill sites CD3 and CD4 for ConocoPhillips Alaska. Tasked with reusing project data to generate several new drill sites and reduce engineering costs to the client, VECO generated and executed a method for reusing intelligent project data. Because ProjectWise is integrated with AutoPLANT, VECO can utilize the security and management of ProjectWise while taking advantage of AutoPLANT.

VECO used the auto-generated drawing feature in the AutoPLANT I&W to produce schematics, wiring and loop diagrams, and termination drawings. VECO also uses attributes to progress documents – updating the status of an attribute at each state in the routing process. Once a document is accepted at a particular state, users are denied editing rights. VECO uses the “set final status” state to prevent users from doing further modifications.

**WINNER**

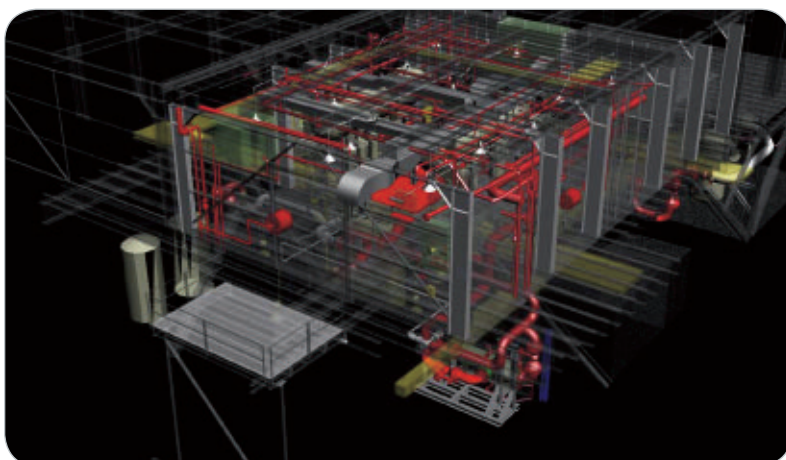
VECO

**Tyonek Test Separator**

Anchorage, Alaska, United States

VECO was tasked with upgrading several major pieces of equipment on the Tyonek platform in Alaska to reduce particulates in the gas for better transmission through the pipeline. The project schedule was tight and shutdown time was critical. Accurate drawing information was not available due to poor as-builts. Therefore, 3D laser scanning, Bentley CloudWorx and AutoPLANT were selected to solve this important project for ConocoPhillips Alaska.

To reduce downtime, owner-operators must have faster and more accurate access to data. Until now, gathering this data, organizing it, and putting it into a 3D model was difficult. Using AutoPLANT, VECO was able to design to true as-built conditions and check for interferences in an extremely congested area. When issues were discovered, VECO could communicate quickly with the field operators with 3D images for prompt resolutions.



2005 WINNER

YORK International/A Johnson Controls Company

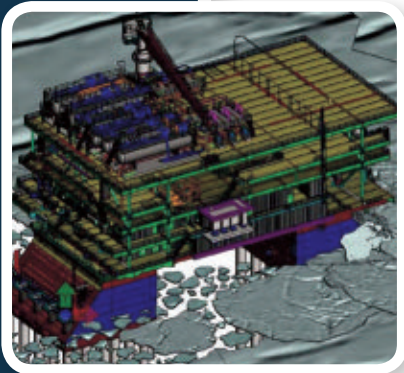
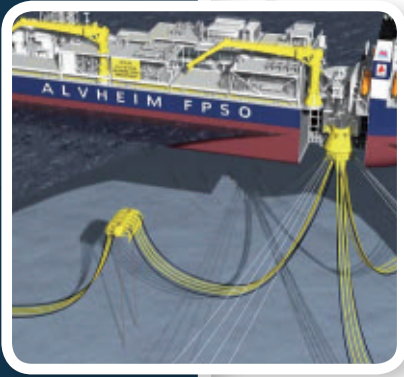
## Zueitina Propane Refrigeration System

Masa El-Brega, Libya

The Zueitina Propane Refrigeration System is a packaged propane vapor recovery unit. The system is a combined atmospheric storage refrigeration system for propane and butane that are produced from a gas separation facility nearby. It consists of two individually fabricated skids shipped to the Zueitina LPG Terminal in Masa El-Brega, Libya.

The project consisted of a driveline package and a vessel package bolted together in the final stages of assembly to complete the piping between them. Bentley Explorer was used by engineers and designers to visually inspect the model for pull clearances, maintenance areas, and interferences prior to the job being built. Using AutoPLANT, the bills of material were created directly from the database.





# Offshore

The projects in this category represent tremendous innovation in the use of Bentley software to produce intelligent infrastructure that is measured in terms of operational efficiency, constructability, safety, and use of energy and non-renewable resources in marine environments. This category recognizes projects that have created new and sustainable value in every stage of the facility lifecycle.



# OFFSHORE

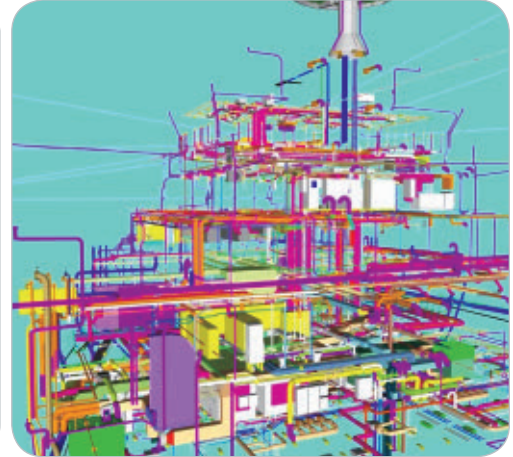
Aker Yards ASA, Langsten

## Delivering the World's Biggest and Most Advanced Seismic Vessel on Time

Tomrefjord, Norway

Shipyard Aker Yards, Langsten has delivered the world's biggest and most advanced seismic vessel on schedule. Aker Yards completed the new flagship Ramform Sovereign for Petroleum Geo-Services. A third-generation Ramform, it is a step forward in seismic acquisition capability. This complex project required a flexible and accurate tool for an exact pipe layout design to fit all equipment inside the hull.

The team used a customization of AutoPLANT Piping for accurate fittings according to yard standard pipe specifications. This included best-practice ship pipe fabrication components, penetration pieces, and special connectors. The challenge was to get details correct, place equipment, and weave the pipe between the steel. The project required more than 3,400 prefabricated isometric drawings delivered to the client in 22 months.



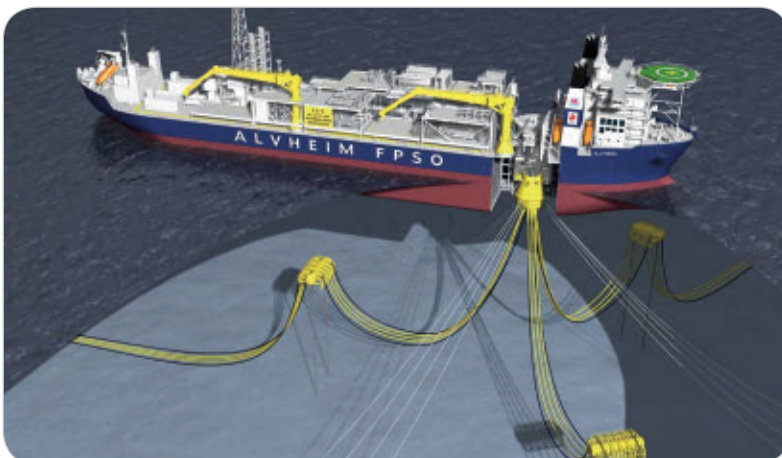
APL

## Alvheim Field Development Project

Arendal, Norway

The Alvheim project is an oil and gas field in the North Sea operated by Marathon Petroleum. The oil and gas is produced using a floating, production, storage, and offshore loading unit equipped with the submerged turret production technology developed by APL. Design lifetime is 20 years and oil production is projected to be 120,000 barrels per day.

The buoy in this project was the largest that APL has designed, and there were extreme demands for close pipe routing and pipe stress. All piping from the subsea riser to the swivel and from swivel to the ship interface was designed with AutoPLANT, using Isogen for generating isometric drawings. AutoPLANT was also used for the routing of all cable trays and hydraulic tunings.



**FINALIST**

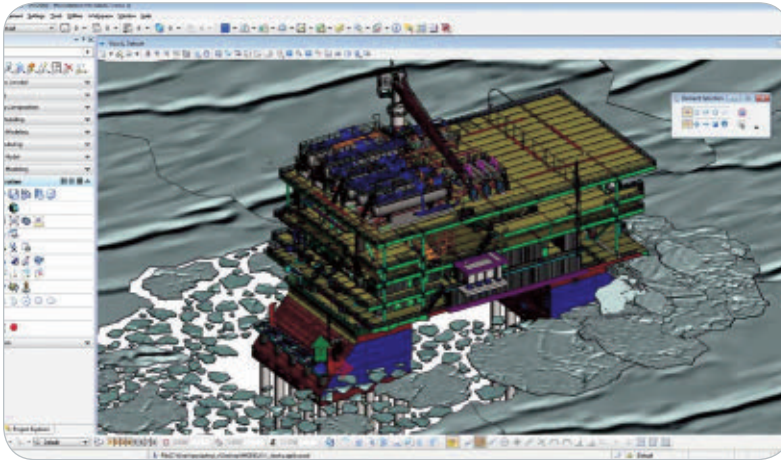
CNGS Engineering

**Central Process Platform – V. Filanovsky Oil Field**

Caspian Sea, Russia

This RUB 16 billion ice-resistant offshore platform is one of the largest and, due to extreme conditions, most complex projects in the Caspian Sea. In the coldest months, the peak temperature averages -20° C (-4° F) and can drop as low as -36° C (-32.8° F). The support units were designed using 3D modeling to sustain the platform's massive weight as well as prevent ice-load damage.

CNGS Engineering is leading a group of eight subcontractor team members who are using ProjectWise to eliminate file-transfer difficulties. Other software being used on the project includes SACS, AutoPIPE, AutoPLANT Piping, Bentley Piping, Bentley OpenPlant PowerPID, Bentley PlantSpace Equipment, Bentley PlantSpace Piping, Bentley Building Mechanical Systems, MicroStation, Bentley Navigator, and promis•e.



2010 FINALIST

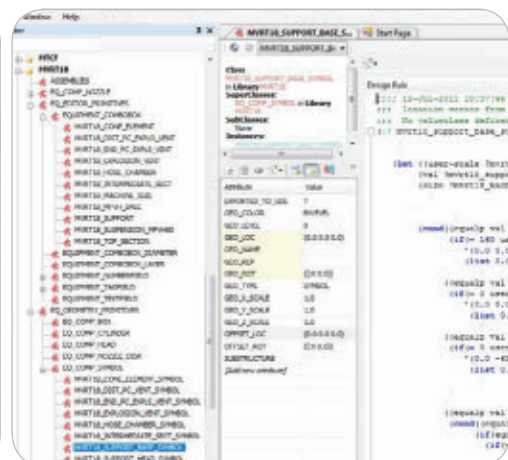
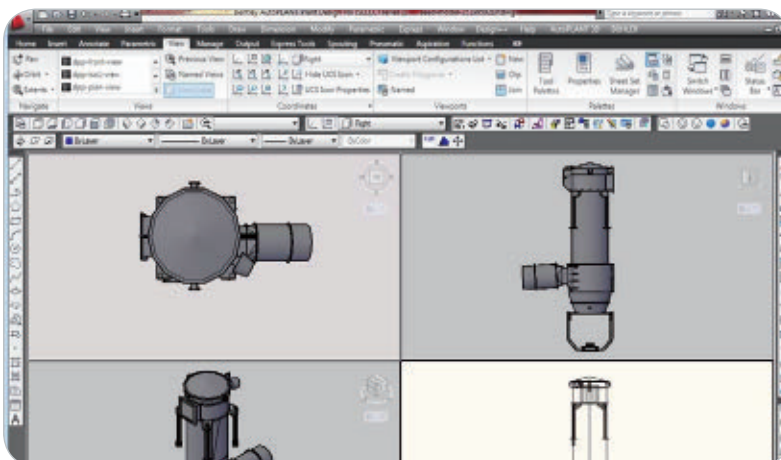
Kavin Engineering and Services Private Limited

**FPU JOKOTOLE**

Terang Sirasun Batur Field, Indonesia

Kavin Engineering and Services was retained to perform detailed engineering of the complete topside facility for a floating production unit to be stationed at the Terang Sirasun Batur Field in offshore Indonesia. The topside facility contains eight process modules requiring process, piping, mechanical, structural, electrical, and instrumentation. Collaboration among multiple disciplines was the key challenge on this USD 350 million project, along with conforming to client requirements and international standards.

Kavin took advantage of the data-centric approach inherent in AutoPLANT, ProSteel, STAAD.Pro, and Bentley Navigator. Piping, isometrics, and general arrangement drawings were done using AutoPIPE, and structural modeling and 2D drawings for pipe supports, handrails, ladders, and grating were performed using ProSteel. Raceways and instruments were modeled with AutoPLANT Raceways.





# OFFSHORE

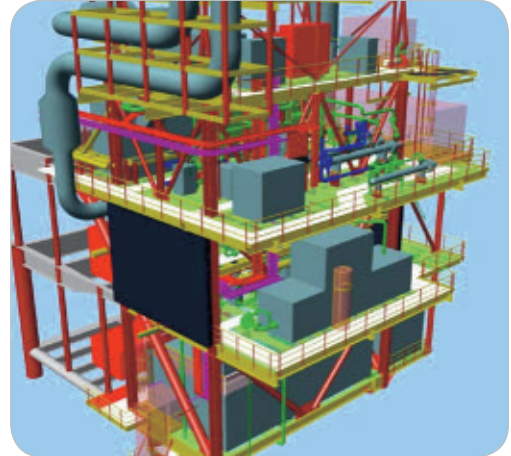
Petrofac

## CNS Subsea Tieback and Gas Compression Module

Aberdeen, United Kingdom

The U.K. project consists of a new 1,200-metricton module, Brownfield modifications, and a subsea tie-back to the host platform. Petrofac used AutoPLANT to capture as-built plant information, which provided a 10 percent savings in onshore piping man-hours. Not only are there fewer steps in the process of designing the piping, but the amount of offshore survey time has been dramatically reduced.

The firm now plans on taking several designs offshore for a quick check, whereas previously this would have required at least two surveys and the use of a conventional laser survey company for final dimensional verification. This reduction in offshore survey time has been estimated at trading off eight days of scanning against 1,000 piping survey hours. This equates to a direct project saving of some GBP 20,000, with the more subtle benefit of much-reduced offshore contact hours.



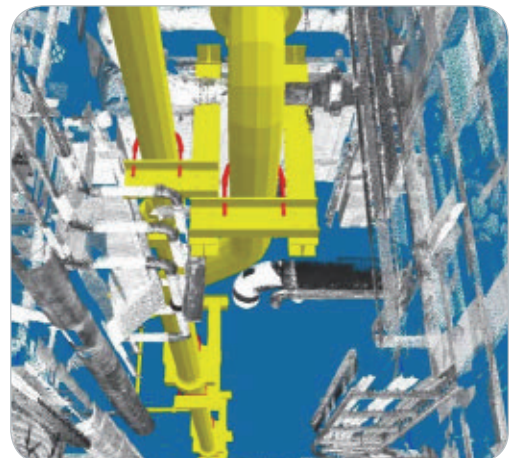
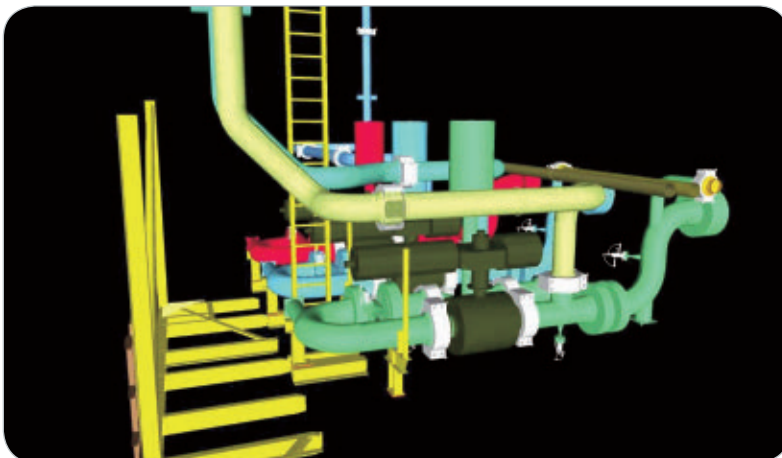
Petrofac

## East Brae Low-Pressure Operations

Aberdeen, United Kingdom

The East Brae facility is located in 120 meters of water. A steel-legged fixed platform installed in the early 1990s, it produces gas and associated condensate, both of which are exported via pipeline to onshore sites for further processing. The facility has approximately 10 wells in production drilled from the platform, and also produces gas and condensate from a subsea tieback to the main host.

During the design phase of the project, AutoPLANT was populated with the required piping specifications for the facility. By close interaction of the AutoPLANT modeler in conjunction with the cloud-point scan, suitable routings for the new pipework and valving were identified. This approach has avoided clashes, as the scan information is as-built and accurate to +/-5 millimeters.





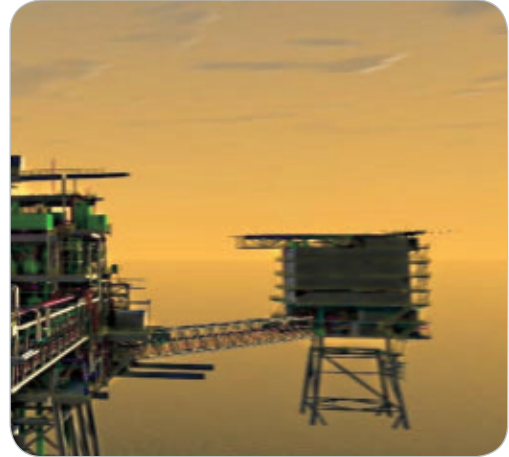
**WINNER**

## Qatar Petroleum Creation of Intelligent As-Built Models of Offshore Facilities Using a Combination of Terrestrial Laser Scanning and Verified Existing Engineering Drawings

Doha, Qatar

Qatar Petroleum facilities on three offshore platforms and one island had no as-built master engineering records. This USD 18.9 million project created a consolidated as-built 2D/3D master engineering record for asset management and maintenance. Qatar Petroleum converted all P&IDs to intelligent 3D models and extracted and updated as-built inspection isometrics, piping general arrangement drawings, and layout drawings.

Qatar Petroleum reverse-engineered the facilities through 3D laser scanning, intelligent modeling, and 2D drawing verification. The scalability and intuitive interface of AutoPLANT products allowed for quick deployment. PlantWise saved time extracting 2D drawings. Bentley Navigator, ProjectWise, and Bentley i-models facilitated reviews and data sharing among contractors. Qatar Petroleum completed the project in 43 months.



2011 WINNER

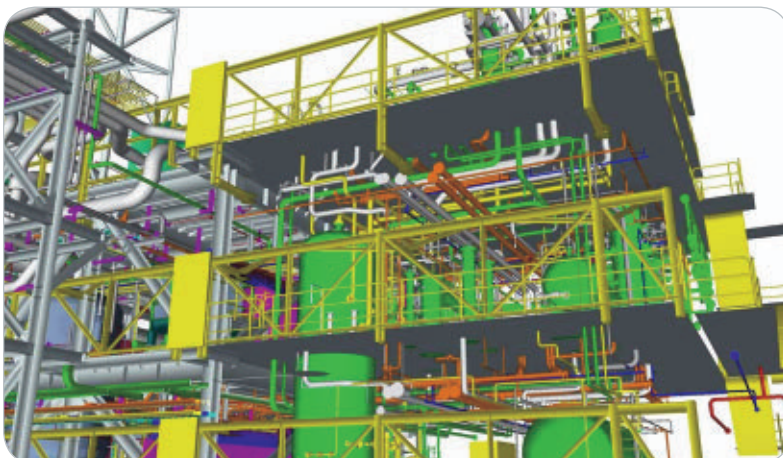
Quip S.A.

## Offshore Platform P53

Rio de Janeiro, Brazil

Located 120 kilometers off the Brazil coast and moored at a depth of 1,080 meters, this floating producing unit (FPU) platform will have the capacity to produce and process 180,000 barrels of gas a day and 6 million normal cubic meters of gas. The FPU will not stock the produced oil and gas in its tanks, as they are immediately transferred to other platforms.

Quip S.A. developed the FPU P53 platform and presented all review sessions using AutoPLANT and Bentley Navigator, which gave the engineers and technical team access to 3D visualization so potential problems could be identified in advance. This was the first 3D visualization initiative in Brazilian offshore projects and now other Brazilians EPCs are starting to adopt this concept.



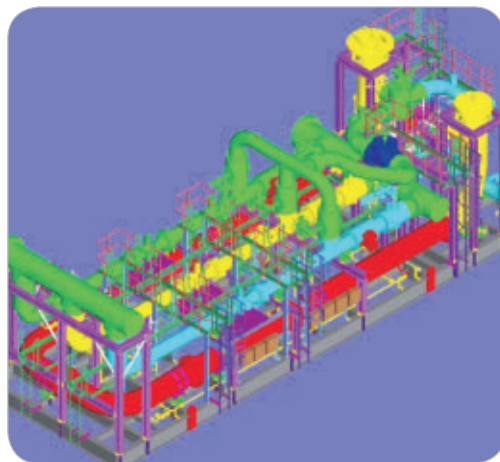
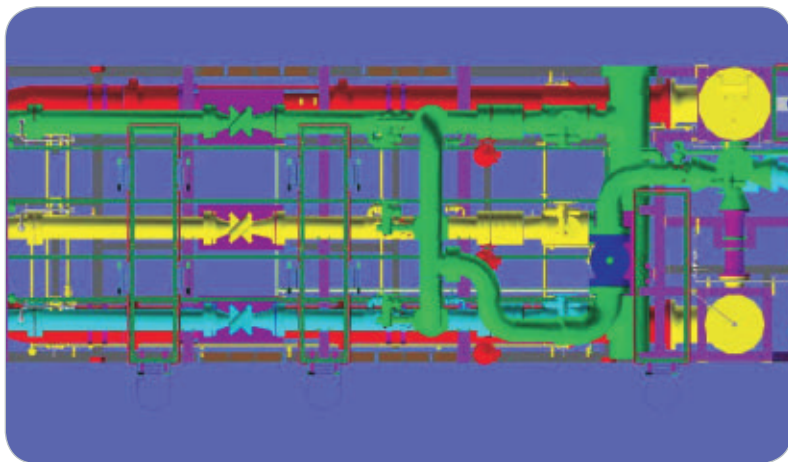
Rishabh Software Pvt. Ltd.

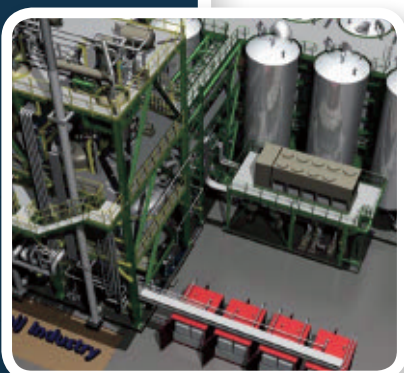
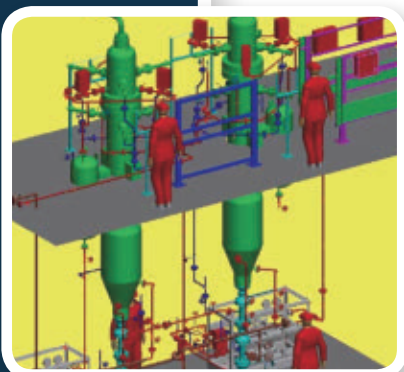
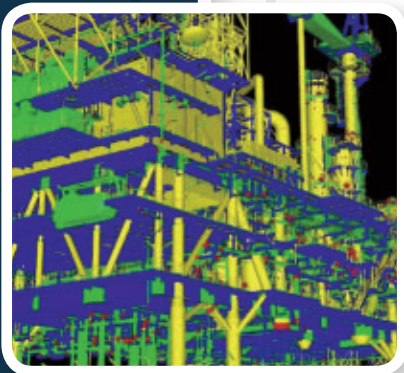
## Hebron Topside Project

Atlantic Ocean, Canada

Hebron is a heavy oil field located in the Atlantic Ocean, 350 kilometers southeast of St. John's, the capital city of the Canadian province of Newfoundland and Labrador. Utilizing WorleyParsons' expertise in sub-Arctic float-over topsides at water depths of 92 meters, Rishabh Software was contracted to design the metering skids for the piping and structural disciplines.

Rishabh Software – an ISO-certified piping and mechanical engineering house – used ProjectWise to integrate a design team distributed over multiple locations, and ProStructures, AutoPLANT Piping, and AutoPLANT Equipment for the offshore platform in which the fiscal metering skids needed to be employed. The firm detailed the skids and provided all drawings and models in native format so the client could design them using ProSteel. The 3D models created reference data that helped avoid clashes.





# Process Manufacturing

This category covers a wide range of industries including upstream and downstream oil and gas facilities, petrochemical and chemical complexes, pharmaceutical and manufacturing plants, and more. For greenfield plants and retrofits to existing plants, safety and environmental concerns are at the top of the priority list, and the management of engineering information and innovative use of technology are critical to achieving project success and process improvements.



# PROCESS MANUFACTURING

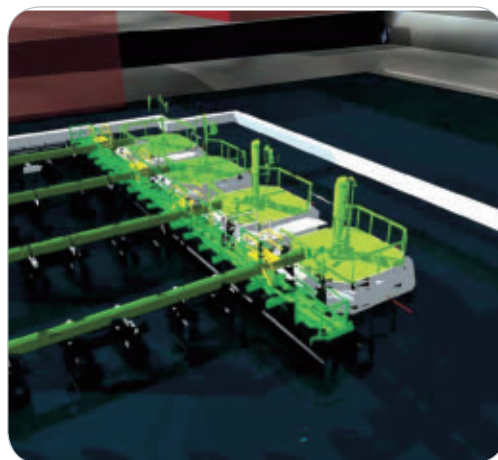
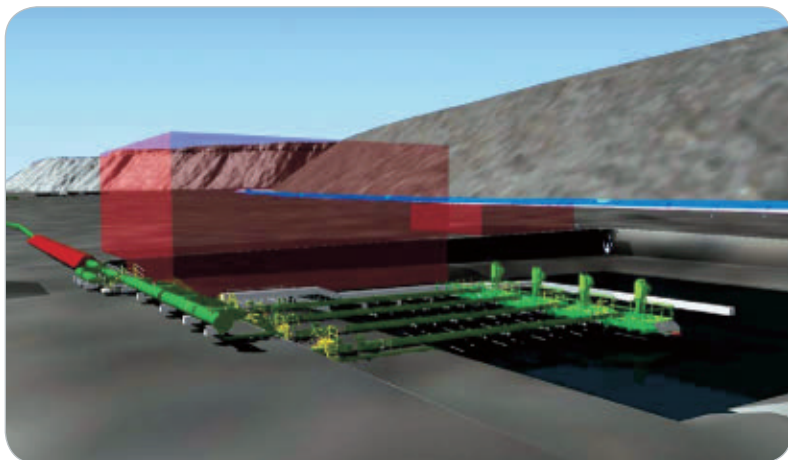
## Ausenco

### Global Worksharing for Aktogay Copper Mine Project

Ayagoz District, Kazakhstan

Kazakhmys' USD 2 billion Aktogay project, encompassing comprehensive facilities for copper processing in Kazakhstan, is the first project developed in Ausenco's Santiago office in a workshare environment with offices in Perth, Australia, and Mumbai, India. The Santiago office implemented AutoPLANT software and the ProjectWise engineering information management system, replacing 2D software packages. Using these systems allowed centralized administration of the information, access control across participating offices,

and immediate synchronization of data. Both systems fed the centralized Ausenco database, AusDB, which is used by the procurement group in delivery of engineering, procurement, construction, and management services. The reliability of Bentley software, customized by Ausenco, allowed the office to fulfill its project role. The office also acquired the ability to create intelligent 3D models that were backward compatible with the DWG format.



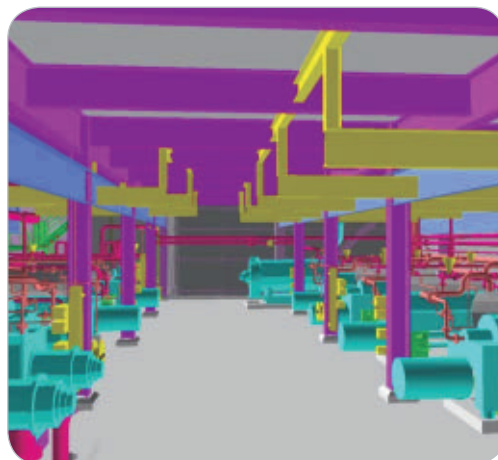
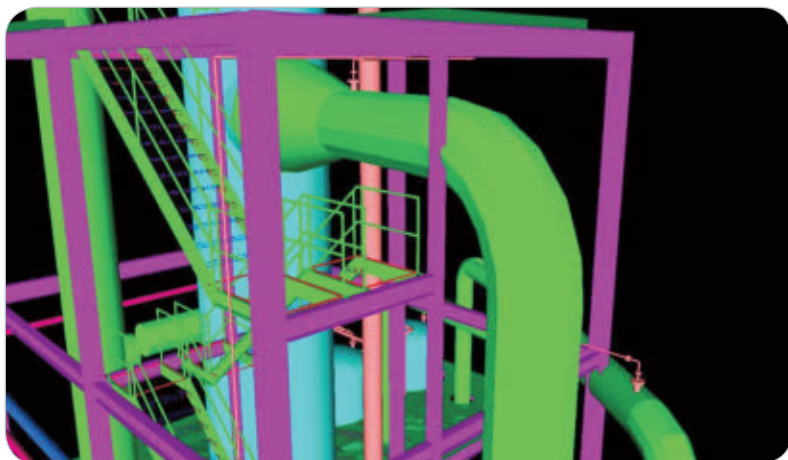
## Cargill Starches and Sweeteners

### Wheat Starch Plant

Manchester, United Kingdom

In this USD 120 million project, Cargill Starches and Sweeteners modified its Wheat Starch Plant in Manchester, United Kingdom, to accommodate the processing of a completely different raw material. High accuracy in design was essential for avoiding any spills and leakages since food alcohol is a highly taxed product.

Project teams for different disciplines were located in United Kingdom, Germany, and the central office in the Netherlands. ProjectWise and AutoPLANT proved to be the most efficient for integrating all disciplines – including civil requisition, piping, and equipment modeling – with the main equipment supplier's input. The company successfully executed an online model review with the main team for procurement and construction for the plant.



## FINALIST

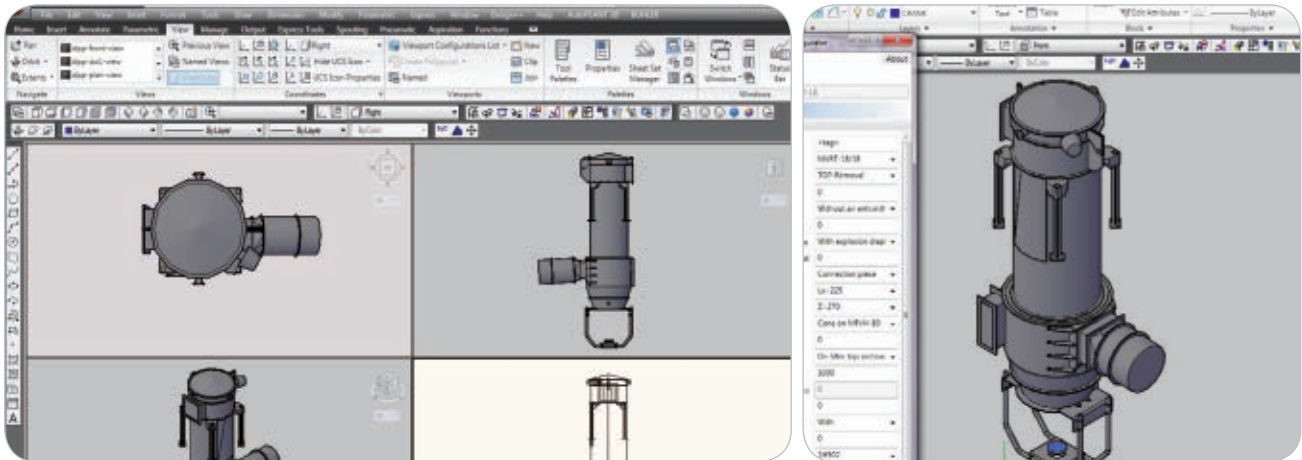
Chemical Construction International (P) Limited

**Carotino Fatty Acid Splitting Plant**

Johar Baru, Indonesia

Carotino's USD 50 million Fatty Acid Splitting Plant in Malaysia will use a chemical-thermal pressure process to split oils and fats into fatty acids. Plant design had to be fully complete before construction to meet a tight schedule. Chemical Construction International performed all aspects of detailed engineering, including structural, mechanical, electrical, instrumentation, piping, and automation.

AutoPLANT helped to create plant designs in less time. With a consistent design process and efficient generation of deliverables, AutoPLANT P&ID reduced man-hours by nearly 30 percent. Vessel placement plan and elevation drawings that used to take up to 20 days took less than three days. To protect its commercial interests, the company handed over Bentley i-models for client review.



2011 FINALIST

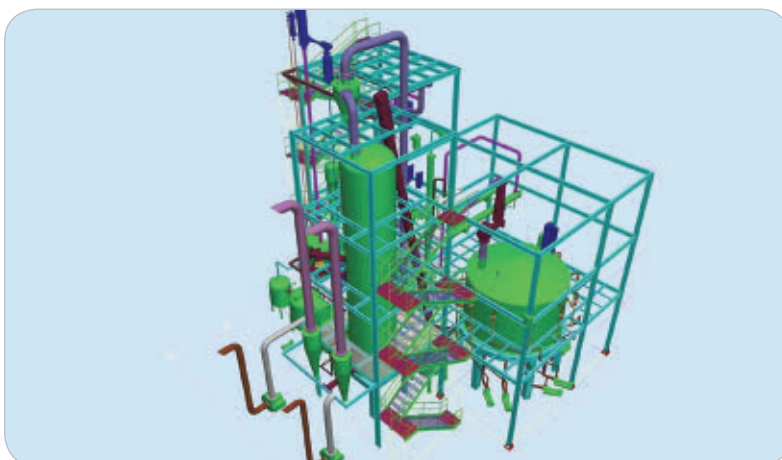
Chemical Construction International (P) Limited

**CCI Solvent Extraction Plant**

Chennai, India

The USD 2.5 million CCI Solvent Extraction Plant in Chennai, India, is designed for the extraction of vegetable food oil from soybeans. The process uses hexane as a solvent in a highly efficient carrousel extractor. Precise design of the absorption tower has helped to limit the hexane solvent being exposed to the atmosphere.

This was the first time Chemical Construction International executed a live project in a 3D environment. With a built-in library of equipment and piping components, AutoPLANT saved time on configuration and placement. The 3D visualization also detected interferences well before construction.



# PROCESS MANUFACTURING

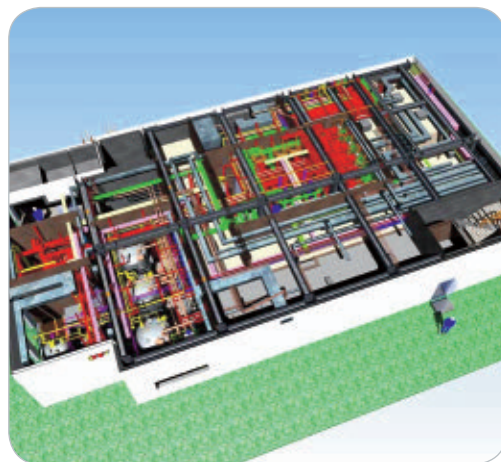
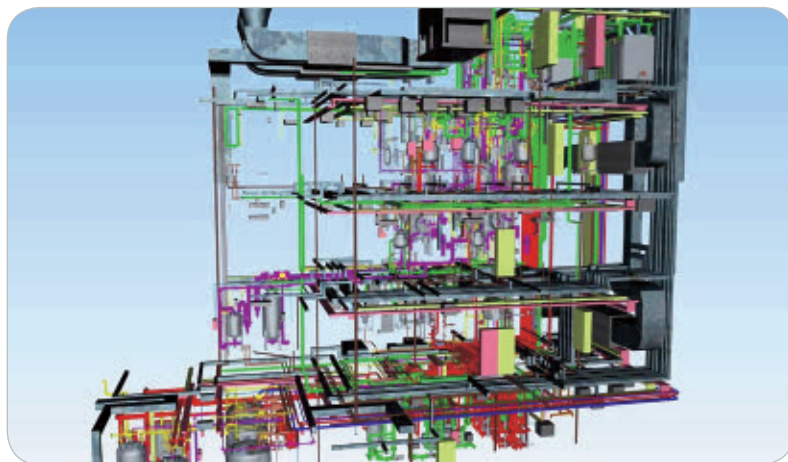
Chemoprag s.r.o.

## High Potent API Facility

Blansko, Czech Republic

Synthon, a global company that produces high-quality products for the medical profession, charged the Chemoprag project team with the design and construction of a new greenfield plant in the Czech Republic town of Blansko. Because the four-story building proved too small for the plant, the project team deployed 3D modeling to visualize how the plant should be designed for the area.

AutoPLANT was used to coordinate space for HVAC, piping, electrical, low voltage, and sanitary facilities. The software also enabled the construction team to coordinate efforts across all disciplines and implement necessary data for designers to use, including a large number of piping classes. The integrated workflow allowed completion of the project in 12 months, saving five designers nine months of work.



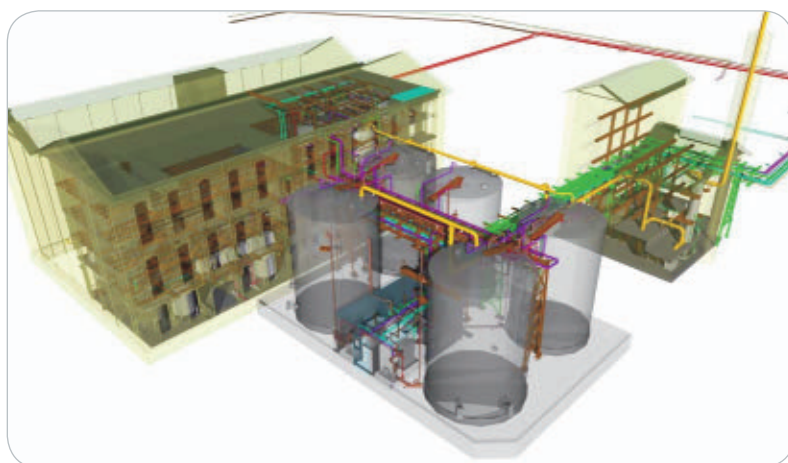
Chemoprag, s.r.o

## Sugarmill Vrdy Bioethanol

Vrdy, Kutná Hora, Czech Republic

The goal of this project is bioethanol production from renewable grain sources, with pure products, environment-friendly by-products, high efficiency, and low investment. The bioethanol production facility in the Czech Republic was constrained by the equipment within an existing sugar mill. The mash and rectification column is located in free space adjoining a structure in which the rest of the process equipment is located.

The plant was split into several process units and civil objects. The mechanical part of five process units has been handled in 3D with AutoPLANT. The very limited space for the distillation equipment showed the advantage of 3D project processing, in which the company checked for clashes resulting from incorrect estimates of insulation thickness. Overall, 3D design saved about two months' work of six designers.

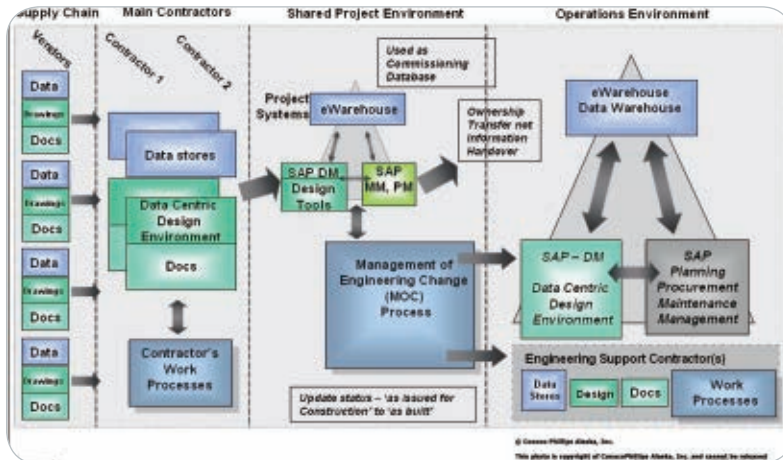




## ConocoPhillips Alaska, Inc. CPAI Managed Environment North Slope, Alaska, United States

The CPAI Managed Environment is designed to provide cost and project execution savings through a standard environment for design in which three EPCs can execute and deliver projects valued at roughly USD 500 million per year. Goals of the program included maximizing data reuse wherever possible; standardizing specifications and deliverables; ensuring data consistency, correctness, and completeness; and managing data across the facility lifecycle.

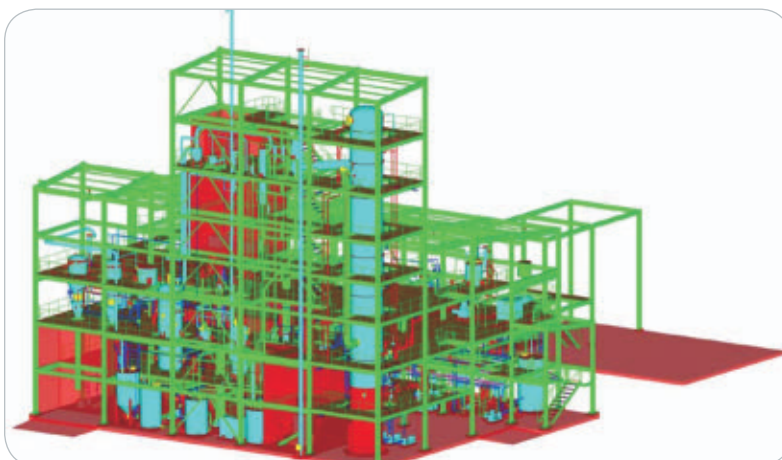
Bentley's Professional Services assisted in creating a custom CPAI environment of arctic specifications and standard details that would work in conjunction with AutoPLANT without compromising the ability to upgrade the core AutoPLANT platform as needed. ConocoPhillips Alaska anticipated a 20 percent savings in engineering costs from the managed environment initiative and 20 to 30 percent in total engineering costs from the data reuse initiative.



## Desmet Chemfood Engineering Pvt. Ltd. Integrated Edible Oil Plant Karnataka, India

This project is an example of an integrated edible oil plant with an area for oil solvent extraction and an area for extracted oil refining. With the goal of maximizing oil yields with typical available feed stock, Desmet Chemfood Engineering utilized Desmet Ballestra Group's design services to optimize layout usage while maintaining modern industrial safety standards.

Desmet Ballestra overcame one of the key obstacles for such a compact multistoried layout by designing simultaneously at a multidiscipline level by using AutoPLANT, which provided the avenue to integrate 2D drafting and 3D modeling environments. Ease of use and the integrated environment saved Desmet Ballestra valuable design time.



# PROCESS MANUFACTURING

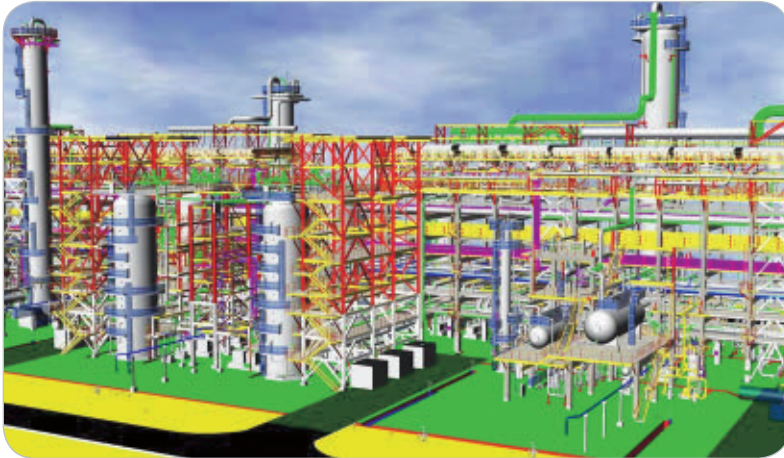
Engineers India Limited

**Kuwait Paraxylene Production Company**

Shuaiba, Kuwait

The firm was contracted to set up a paraxylene plant comprised of six separate units and associated utilities, off sites, and tankage areas. The challenge was the significant size of the project that involved multiple engineering agencies and work centers. The project demanded rigorous planning, customization, setting of procedures, checks, and work standards.

MicroStation, AutoPLANT, STAAD.Pro, and Bentley Navigator offered an effective transition environment between 2D and 3D models. MicroStation provided the overall ability for customization, standardization, and coordination that resulted in significant reduction in time and errors in engineering.



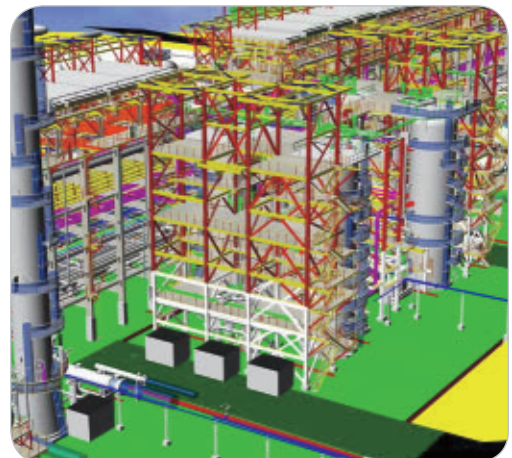
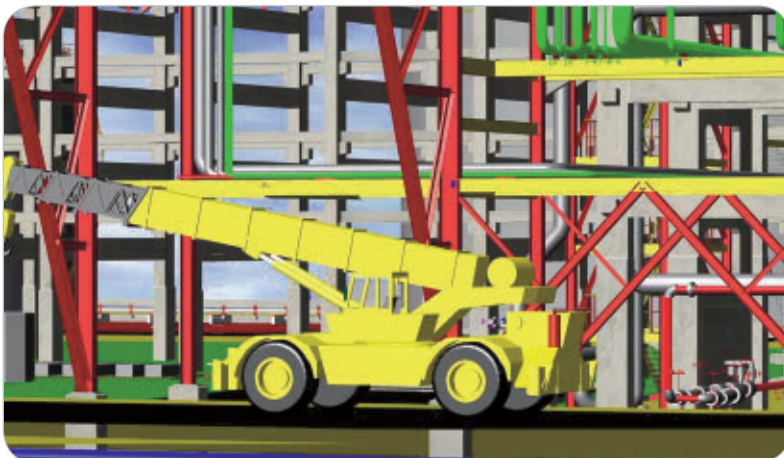
Engineers India Limited

**Kuwait Paraxylene Production Plant**

Shuaiba, Kuwait

The size and scope of this USD 1.2 million Aromatics Complex project for the Kuwait Paraxylene Production Company required collaboration across multiple engineering agencies dispersed among several locations. Implementing a homogeneous and integrated design philosophy required significant effort.

One design challenge was to simulate crane positions in the model for interference with plant piping, structures, and equipment. Using the interoperable capabilities of AutoPLANT, the design team transitioned between 2D and 3D models and allowed all disciplines to view them. MicroStation's advanced customization, standardization, and coordination abilities reduced errors and maintained the project schedule.





**WINNER**

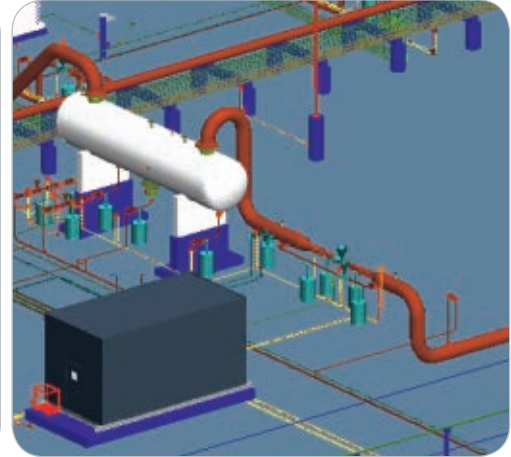
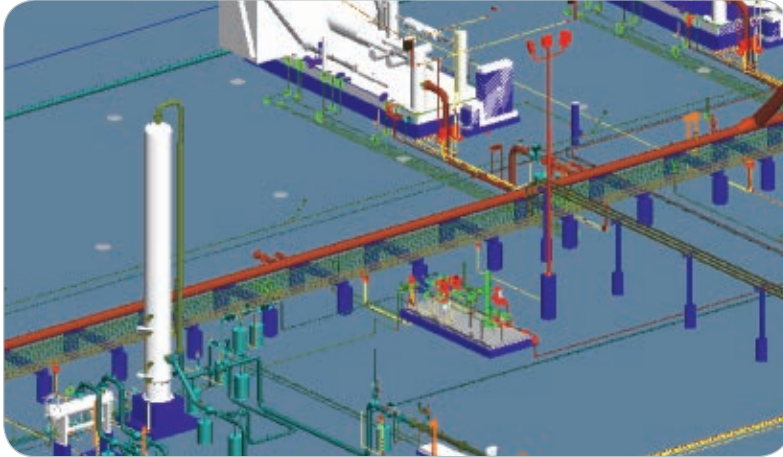
Enogex LLC

**Implementation of AutoPLANT and ProjectWise**

Western Oklahoma, United States

Enogex and its subsidiaries own and operate more than 8,200 miles of pipe, seven processing plants, and 24 billion cubic feet of natural gas storage capacity in Oklahoma and Texas. In 2009, Enogex implemented AutoPLANT to standardize and reduce design and drafting time for gas gathering compressor stations. Within three years, the USD 10 million initiative reduced cycle time by 85 percent.

In 2009, average cycle time was 1,450 man-hours. Leveraging AutoPLANT reduced average cycle time to 220 man-hours in 2012. AutoPLANT's multilevel model structure allowed several users to access and modify files concurrently. Subsequent integration with ProjectWise improved file organization, workflow, and information dissemination. As a result, project request delivery turnaround time was shortened from 16.4 workdays in 2010 to 11.65 workdays in 2012.



2012 WINNER

Equinox Engineering Ltd.

**CNRL Primrose East Pipelines**

Cold Lake, Canada

Canadian Natural Resources is expanding its facilities in the East Primrose area of the Cold Lake Air Weapons Range in western Canada. The CAN \$54 million project involves the development of six new cyclic steam stimulation well pad facilities for bitumen recovery. Equinox Engineering provided design, procurement, and construction of the associated above-ground thermal pipelines.

AutoPLANT was used for intelligent 3D modeling and general arrangement drawings. The ability to extract accurate bill of materials allowed the company to procure critical, long-lead items from around the world with no delays. AutoPLANT also worked seamlessly with AutoCAD-based terrain modeling software, ensuring optimal pipeline heights and minimal forest clearing that reduced construction costs.





# PROCESS MANUFACTURING

Equinox Engineering Ltd.

## Musreau Gas Plant

Grande Prairie, Alberta, Canada

Paramount Resources expanded the Musreau Gas Plant south of Grande Prairie, Alberta, Canada, in two phases: a 45 million standard cubic feet per day (MMSCFD) gas processing facility and refrigeration plant; and a 200 MMSCFD gas processing train and turbo expander plant for ethane and hydrocarbon liquids extraction. An inlet sweetening expansion under development will add a 200 MMSCFD amine plant.

Equinox Engineering designed and installed the Phase I plant; provided detailed design, procurement, and construction management for Phase II; and commenced detailed design and equipment procurement for the expansion. Bentley's AutoPLANT suite of products was used for all phases of the CAD 100 million project. Intelligent 3D models were used to perform clash detection, generate 2D drawings, extract bill of materials, and generate isometrics. AutoPLANT ensured that there would be no design delays.



Grontmij Industry

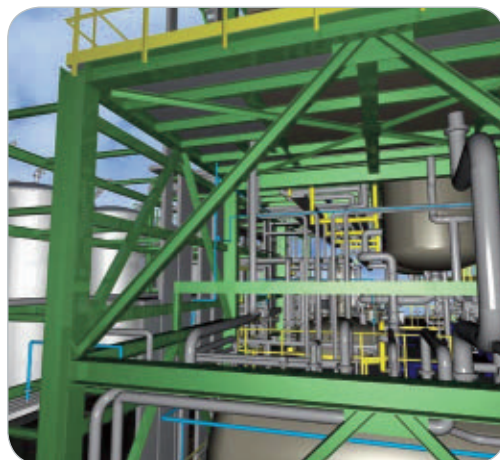
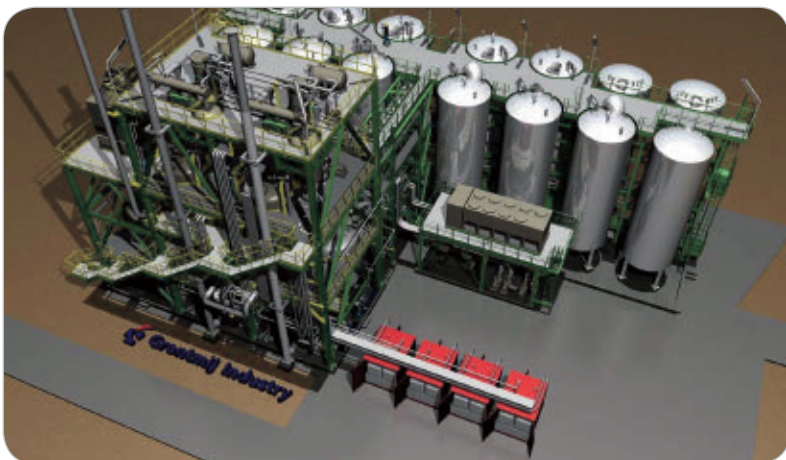
## Fully Automatic Production Unit for Sika

Zwijndrecht, Belgium

**WINNER**

Grontmij Industry provided engineering, procurement, and construction management for a USD 12.9 million high-performance concrete plasticizer production installation at the INEOS Oxide site in Antwerp, Belgium. The project needed to be built as fast as possible so it was split into three phases: storage area, chiller area, and process area. This enabled engineering, procurement, and construction of each subphase to take place concurrently.

AutoPLANT was used in this fast-track project to enable geographically distributed team members to centralize design data from all disciplines in a master 3D model. Grontmij requested bids in three stages with just a 3D review file plus detailed bill of materials. This made the scope of work clear to all contractors and decreased bidding time. Contractors were selected and 2D deliverables finalized for each phase while design progressed on later phases.



2010 WINNER

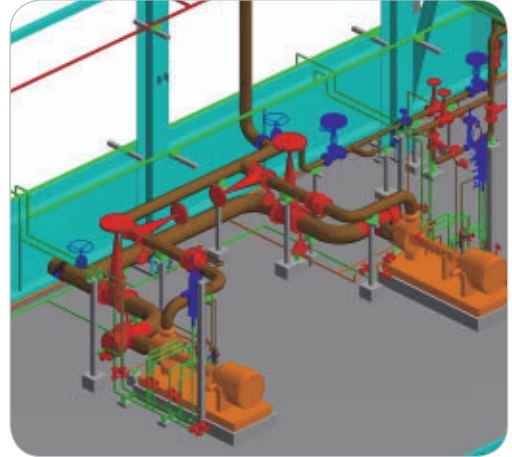
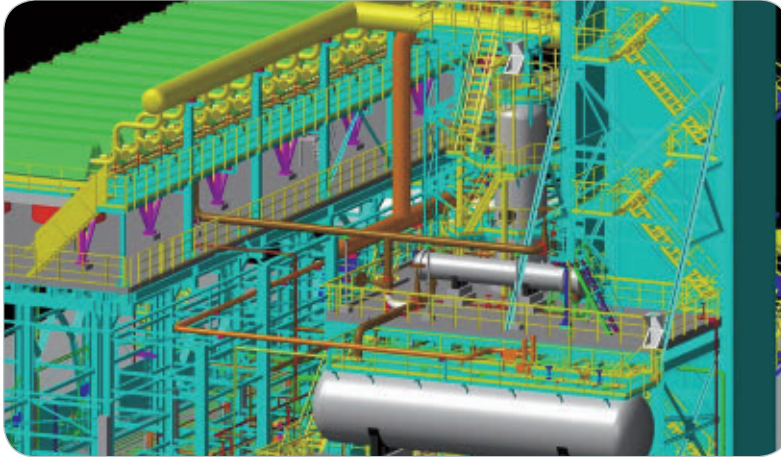
## GUP Bachgiproneftechim

### Deisohexanization Block

Ufa, Russia

The challenge of the Deisohexanization Block project was to increase the octane number of benzine and improve production safety. Difficulties included synchronizing the work of a large team of specialists in different disciplines, in different locations, on different networks, using different plant design systems.

The Ufa, Russia-based institute used a combination of Bentley products – AutoPLANT, PlantSpace, and ProjectWise – to enable different departments (process, piping, mechanical, civil) to work in parallel online as well as to integrate storage and archiving of 2D drawings and 3D models. The 3D models accelerated design time, eliminated errors and collisions during engineering, simplified management approvals, and optimized construction.



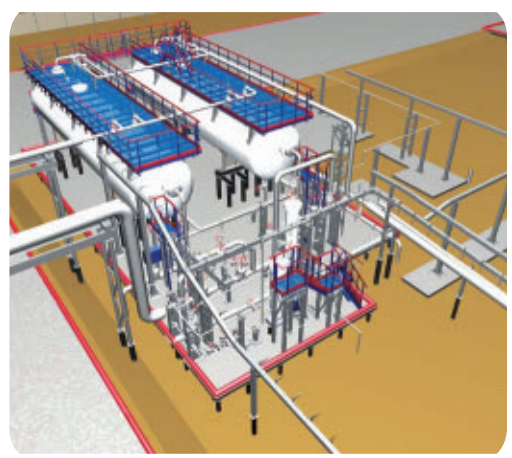
## JSC Neolant

### Construction of Booster Oil-refining Station on Bayandukom Oilfield

Usinsk, Komi Republic, Russia

LUKOIL-Komi, a subsidiary of LUKOIL Oil Company, in association with its territorial production enterprise, LUKOIL-Usinskneftegaz, is expanding the oil loading station at the Bayandukom oil field in Russia's Komi Republic. Due to production growth, new piping and instrumentation were introduced to improve separation quality and reduce scavenger dosage. To automate the branch operating department's workflow, Neolant developed a 3D model of the site that will enable the owner to make decisions remotely about station operations and maintenance.

Bentley solutions were used to develop all aspects of the model, including AutoPLANT P&ID, AutoPLANT Equipment, AutoPLANT Piping, Bentley Structural, and Bentley Navigator. ProjectWise accelerated the process of interaction and coordination among participants, and approval of design solutions. Bentley tools reduced engineering design time by 15 to 20 percent.





# PROCESS MANUFACTURING

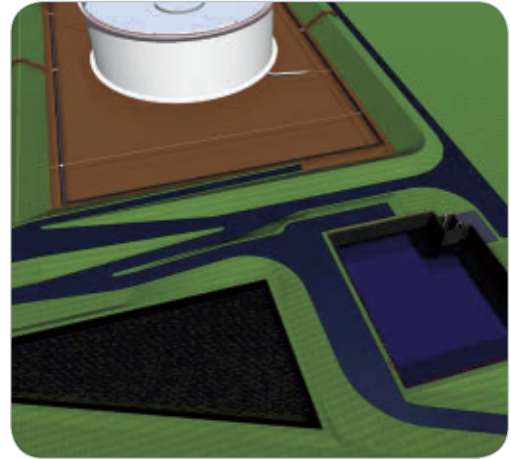
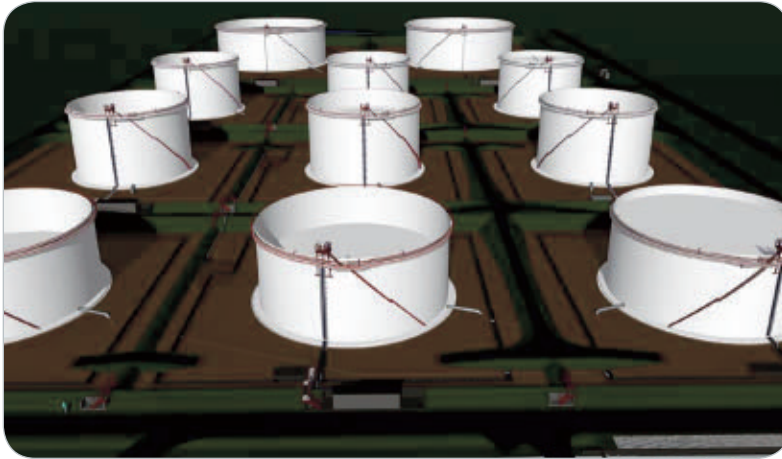
## KH Engineering

### RRP TOP Project

Venlo, Netherlands

When KH Engineering initiated this project at the client's location in Venlo, Netherlands, there was no as-built documentation for the facility under construction. To develop a 3D model, the firm determined that it needed to laser scan the complete location.

KH Engineering deployed AutoPLANT Piping and Bentley OpenPlant PowerPID to create a 3D visualization of the design for the project team and the client's operations department. ProjectWise was used to accelerate information sharing and communications across project teams.



## Koksoprojekt Sp. z o.o.

### Coke Oven Gas Desulfurization

Kosice, Czech Republic

Koksoprojekt's coke oven gas desulfurization project at a coke oven gas process plant in Kosice, Czech Republic, is composed of two units: an ammonia scrubbing liquor stripping plant and a sulfur plant. The goal of the project was to design two units and make the manufacturing process as clean as possible.

With the use of AutoPLANT and software support by Centrum Systemów Softdesk, the average time savings for each project was 50 percent. Project documentation is now almost free from errors, and there is no clash in most of the plant piping systems or the structural part of the project.





Koksoprojekt Sp. z o.o.  
**Coke Plant WZK Victoria S.A.**  
Walbrzych, Poland

Koksoprojekt's goal was to design a plant in Walbrzych, Poland, for coke gas processing. The plant was composed of four distinct units, each of which is dedicated to a different phase of coke gas processing. The company implemented AutoPLANT for the design work and development of 3D models.

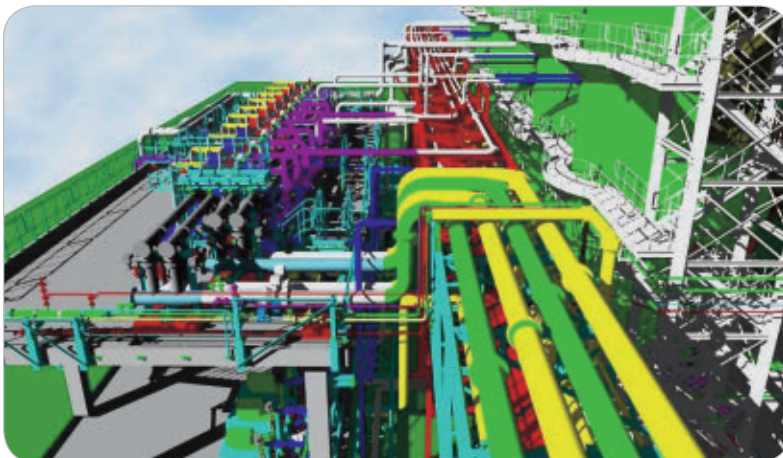
Koksoprojekt also relied on a mix of Bentley solutions as well as software support by Centrum Systemów Softdesk. The company achieved time savings of 50 percent for the project. Project documentation has become almost error free, and documentation revisions and release has become faster and more efficient.



Koksoprojekt S. z o.o.  
**Plant for Ammonia Catalytic Degradation and the Claus-Method  
Sulfur Production in Unit of the Coke Plant "Przyjazn"**  
Dabrowa Gornicza, Poland

With a focus on modern ecological solutions, Koksoprojekt designed and engineered this coke-oven gas purification project. This multidiscipline assignment required extensive knowledge of specific industry technology. Additionally, all the design objects were vast and extremely complicated. Successful project completion relied on Koksoprojekt's ability to ensure P&ID and model synchronization.

Using AutoPLANT 2D to 3D software, the design team could trace the contents of the P&ID diagrams while building the 3D model. The software also helped the team to identify clash detection and produce high-quality isometric documentation. Bentley's integrated CAD software helped Koksoprojekt achieve its goals, improve the quality of the undertaking, and complete the project quickly.



# PROCESS MANUFACTURING

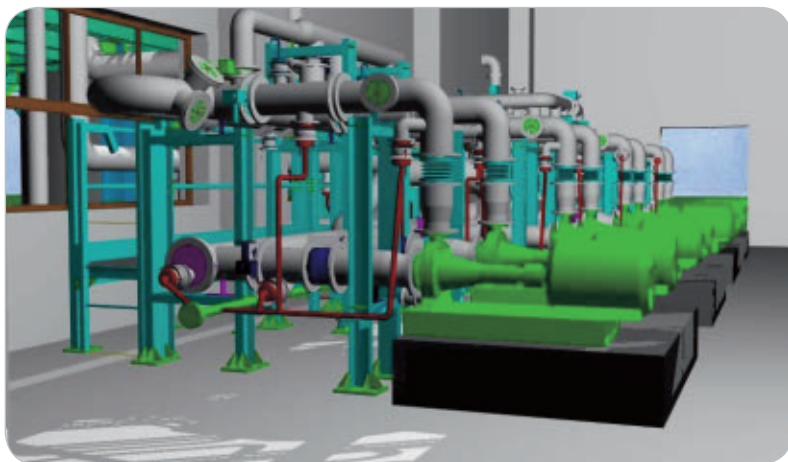
Koksoprojekt Sp. z o.o.

## Plant for Deacidification and Ammonia Desorption

Krakow, Poland

The primary goal of the project was to design a modern plant in Krakow, Poland, for deacidification and ammonia desorption from process water. Koksoprojekt saved significant time by implementing 3D modeling. The relatively small size of data files and drawings provided the capability to efficiently analyze the model and avoid possible clashes, improving the quality of work and reducing the cost of erection.

Enabled by AutoPLANT, AutoPIPE, ProSteel, and ProjectWise, the firm avoided costly mistakes, better synchronized the multistage project preparation process, and gained a higher overall quality at a lower cost. The total project was completed in four months, as compared to the typical time frame for this kind of project of about 12 months.



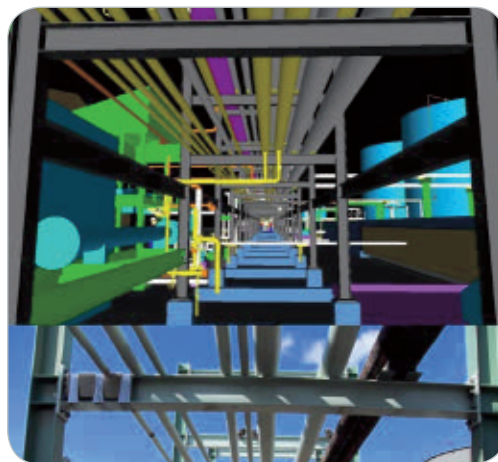
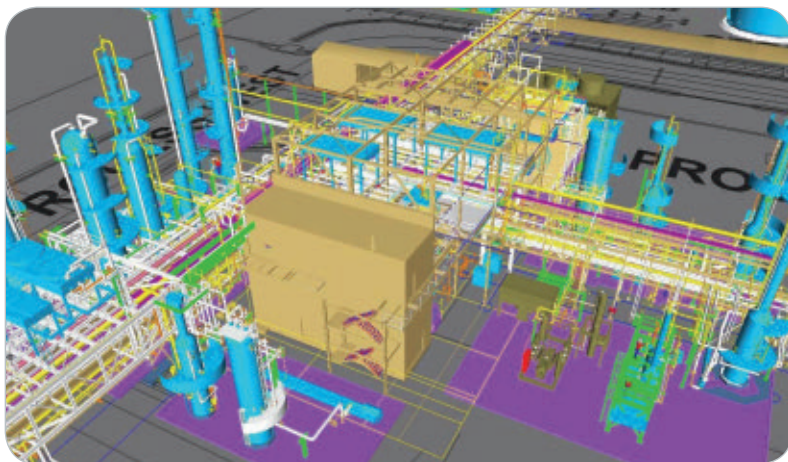
L-Con Engineers and Constructors

## Dynamic Fuels

Geismar, Louisiana, United States

Dynamic Fuels, a joint venture of Tyson Foods and Syntroleum, retained L-Con Engineers and Constructors to design and build the nation's first synthetic renewable fuels plant, converting fats, oils, and greases into high-quality fuels as well as synthetic jet fuel. The USD 138 million project location is a decommissioned and abandoned plant in Geismar, La.

Based on old drawings, soil reports, photos, and surveys, a 3D model was created using AutoPLANT and MicroStation. Verifying and engineering was done with STAAD.Pro and STAAD.foundation, and AutoPLANT Piping and ProSteel were used to complete the 3D visualization. All disciplines were combined in one 3D model so that during model review, using Bentley Navigator, all changes were evaluated for value, cost, and functionality.





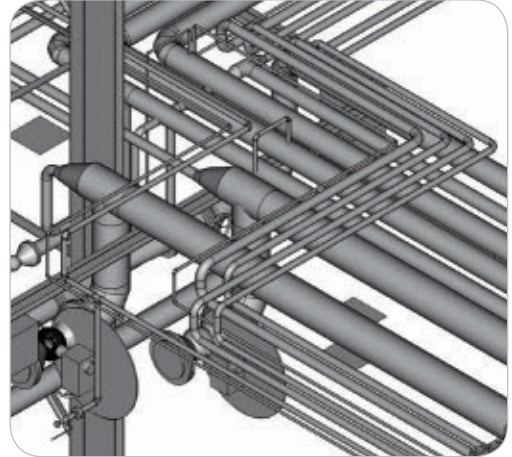
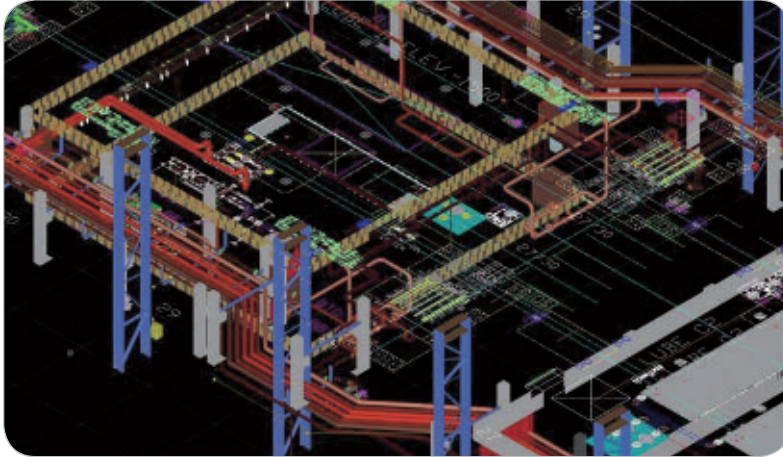
MECON Limited

**Wire Rod Mill**

Visakhapatnam, India

MECON provided services for the USD 135 million Wire Rod Mill at an integrated steel plant in Visakhapatnam, India. The mill has interconnecting piping for oxygen, nitrogen, chilled water, high-pressure water, instrument air, hydraulic oil, lubricating oil, and grease. The piping is laid out by system and runs along the entire mill at different levels and across various locations.

Using AutoPLANT, ProSteel, and Bentley Navigator saved man-hours and costs by allowing designers to explore multiple what-if scenarios. These analyses reduced engineering time by nearly 30 percent. The software integration added immense value through plant commissioning and handover to the client.



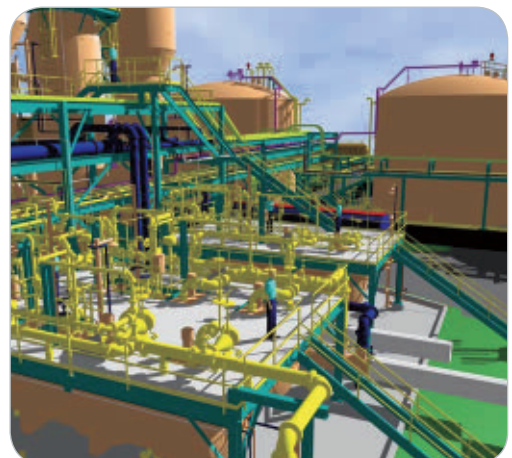
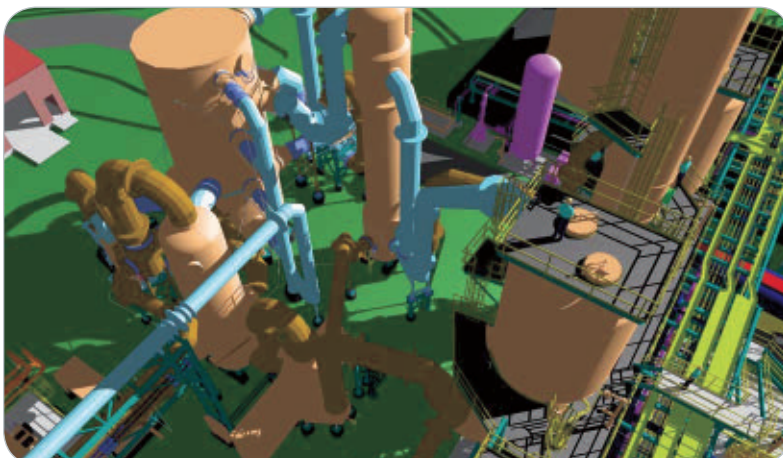
MECS, Inc

**Red Lion SAR Facility**

Delaware City, Delaware, United States

The Red Lion SAR project is a spent-acid regeneration facility located at a petroleum refinery in Delaware City, Delaware. The facility is owned by a Fortune 100 chemical company and is constructed on land leased from the refinery at the perimeter of the property. During detailed design, the engineering team used AutoPLANT to constantly review progress.

The use of AutoPLANT allowed team members to view the layout of the facility and make changes to streamline construction, operation, and, ultimately, future maintenance throughout the life of the plant. By using the visualization software on a daily basis, the 3D modelers were able to reduce interferences by 50 to 75 percent before even using the clash-detection software.





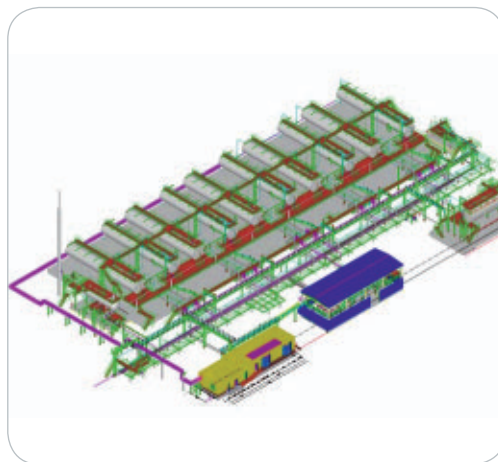
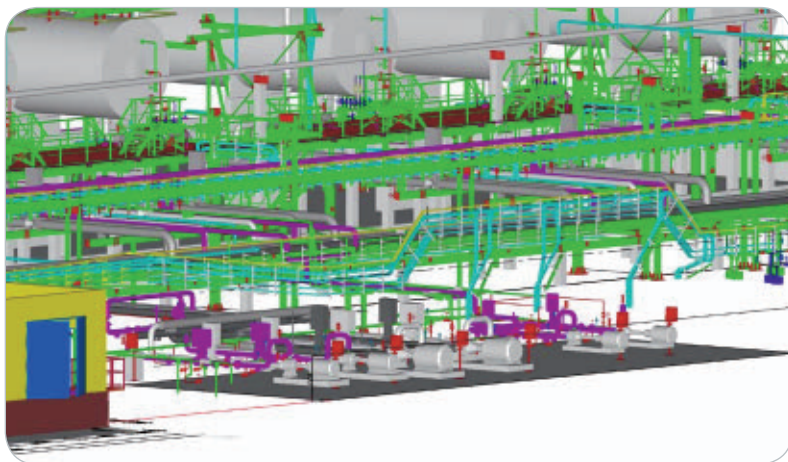
## Mozirski NPZ

### Complex Isomerization of Gasoline

Mozyr, Belarus

In a facility for the isomerization of gasoline, a battery of tanks receives and stores the arriving components of the gasoline. These components are moved from the tanks into a mixer where they are used to prepare commodity gasoline. Mozirski NPZ designed the tank battery structure for a complex gasoline isomerization plant in Mozyr, Belarus.

The project included 10 tanks for reception and storage, six pumps for pumping isomerizate into the mixer, an emergency tank, a drainage tank, a gas separator, and pipelines. AutoPLANT and ProSteel were used for modeling and generation of 2D drawings and isometric drawings. A custom template for isometrics automatically filled in information about pipelines. Overall design time was reduced by 20 percent.



## Nafta-Gaz Sp. z o.o.

### Gas Well Arrangement DEG and TEG Regeneration Block and Pump Station

Jaslo, Poland

Using 3D modeling, Nafta-Gaz built a gas dehumidification unit in Poland to remove the water from dihydric alcohol, increasing the glycol concentration up to 99.2 percent. The unit contains DEG and TEG regeneration blocks and a pump station, which is designed to keep the proper glycol circulation in the system.

Nafta-Gaz found that with AutoPLANT, the overall data management of components, lines, equipment, and instrumentation was improved, and creation of bills of materials was much easier and more reliable. Working with a 3D model prior to implementation cut total project time for this unit from an estimated five months down to seven weeks.



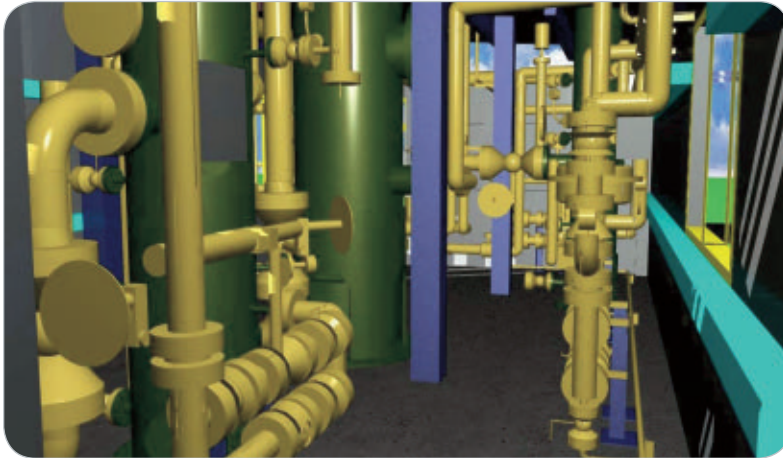
Nafta-Gaz Sp. z o.o.

### Natural Gas Deposits Arrangement

Wielichowo, Poland

The primary goal of this multidisciplinary project in Wielichowo, Poland, was to provide arrangement of the natural gas deposits. Numerous challenges arose during the design process, but Bentley technology enabled Nafta-Gaz to overcome them. For example, corrections and modifications required by the customer were incorporated without introducing human errors.

The 3D model delivered automatic updates of critical data and drawings during successive documentation releases. Significant time was also saved due to 3D modeling capabilities, and reliable documentation was automatically generated rapidly and error free. AutoPLANT P&ID, AutoPLANT Piping, AutoPLANT Equipment, AutoPLANT Vision, ProSteel, Bentley View, ProjectWise, and Bentley Navigator were used in this project.



Nafta-Gaz Sp. z o.o.

### Natural Gas Regulation and Distribution Unit

Jaroslaw, Poland

The primary goal of this project was to revamp an existing natural gas regulating and distribution unit located at the city of Jaroslaw, Poland. Although it was a standard project for Nafta-Gaz, there was significant repetitive work that was particularly prone to error.

AutoPLANT P&ID, AutoPLANT Piping, AutoPLANT Equipment, Bentley Vision, ProSteel, Bentley View, Bentley Navigator, and ProjectWise shortened the design time from six months to two-and-a-half months. AutoPLANT's integrated design of piping systems provided a more effective information interchange between P&ID engineers and mechanical engineers.





# PROCESS MANUFACTURING

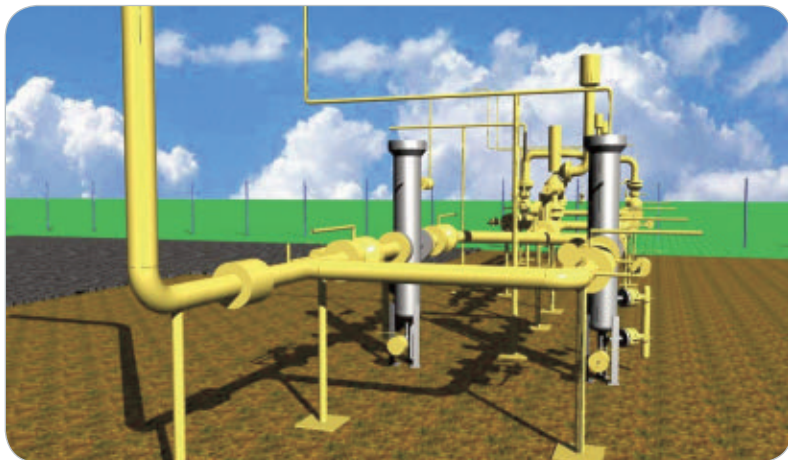
Nafta-Gaz Sp. z o.o.

## Natural Gas Well Arrangement

Roszkow, Poland

The main goal of this project in Roszkow, Poland, was to design the arrangement of the new natural gas well. AutoPLANT, ProSteel, Bentley Vision, and Bentley Navigator delivered a 50 percent time savings.

A centralized project database for P&ID data storage and a 3D physical model workout was implemented. The database was then used for isometrics generation and the AutoPLANT database was configured to store all documents so they were available through the networking environment within the company.



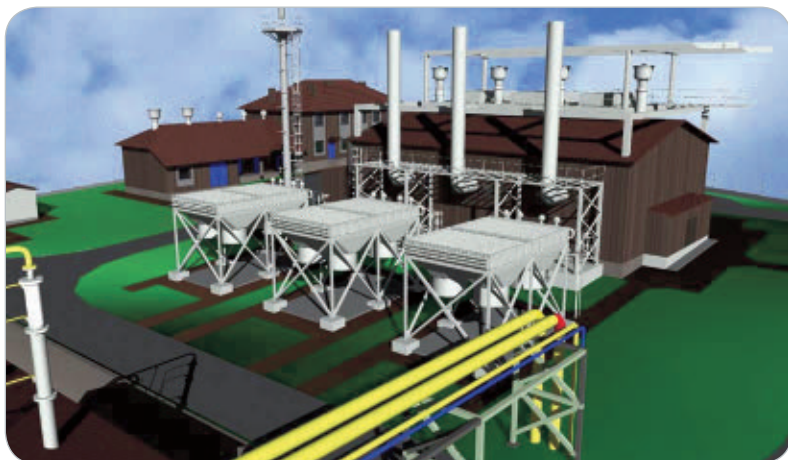
Nafta-Gaz Sp. z o.o.

## Underground Natural Gas Storage Strachocina

Strachocina, Poland

Natural gas storage is principally used to meet seasonal load variations, with gas injected into storage during low demand and withdrawn from storage during peak demand. Secondary purposes include balancing pipeline system flows and maintaining shipping volumes. To meet demand, storage volume at the underground facility in Strachocina, Poland, was increased from 150 million cubic meters to 330 million cubic meters.

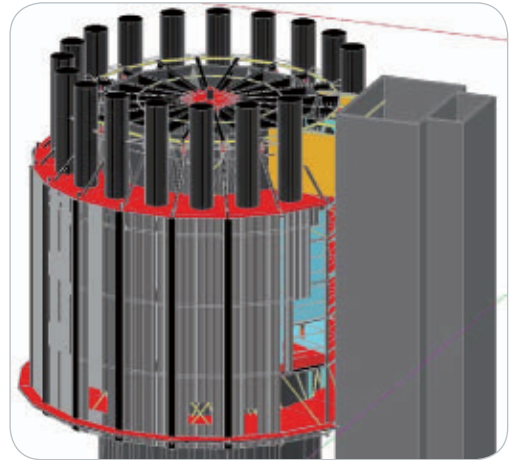
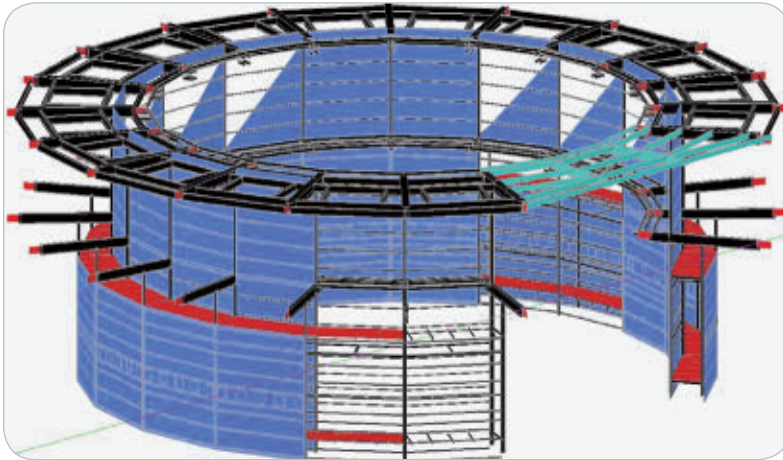
This is the first underground storage that Nafta-Gaz used AutoPLANT to design from piping and P&ID through to the physical model and then to final 2D documentation. AutoPLANT enabled the use of P&ID schematics during the physical model assembly task. The company has been using the software for several years, with average time savings of 50 to 80 percent per project.



Nevinnomyssky AZOT, LLC  
**Carbamide Evaporator Station**  
Nevinnomyssk, Russia

Nevinnomyssky Azot designed a metallic tiered carbamide evaporator station with rigid knots on the frame connected over high-strength bolts. Overlappings on the first tier were executed with monolithic ferro-concrete with metal beams. Overlappings for other levels were executed with metal trellised flooring. Fireproof screens were in the form of a metal skeleton with a zinc covering.

Using ProSteel, AutoPLANT, and Bentley View to create the design reduced project time by 20 percent due to the ability to integrate work from the different Bentley products. Nevinnomyssky Azot estimated that this translated into a 15 percent cost reduction on this USD 150,000 project.



NIIK  
**Modernization of Carbamide Manufacturing Plant**  
Ionalaukio Ruklos, Lithuania

NIIK has completed a USD 250,000 utility transmission and distribution network project at a carbamide manufacturing plant in Ionalaukio Ruklos, Lithuania. The modernized plant is now fully operational. The company based the design of the installation on technology from Snamprogetti, which incorporated equipment imported from Italy.

For the plant's design and construction, NIIK relied on AutoPLANT for its equipment, piping, and drawing flattener capabilities Bentley View, and ProSteel. The innovative technologies allowed for a more streamlined and effective work process.





# PROCESS MANUFACTURING

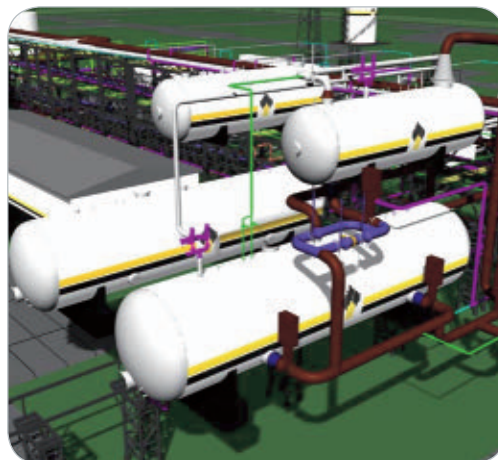
NK Rosneft–NTC

VNK1

Krasnoyarsk, Russia

As part of a major Siberian oil field development project, this project encompassed the development of an oil processing facility in the Krasnoyarsk Territory. The facility will be one of the largest crude extraction and processing plants in Siberia, Russia.

To optimize team performance, engineers and subcontractors from various disciplines were trained to use Bentley products. AutoPIPE and AutoPLANT allowed simultaneous model development among disciplines and enabled fast design reviews. Bentley products minimized project development time and improved overall project quality.



Pall India Pvt. Ltd.

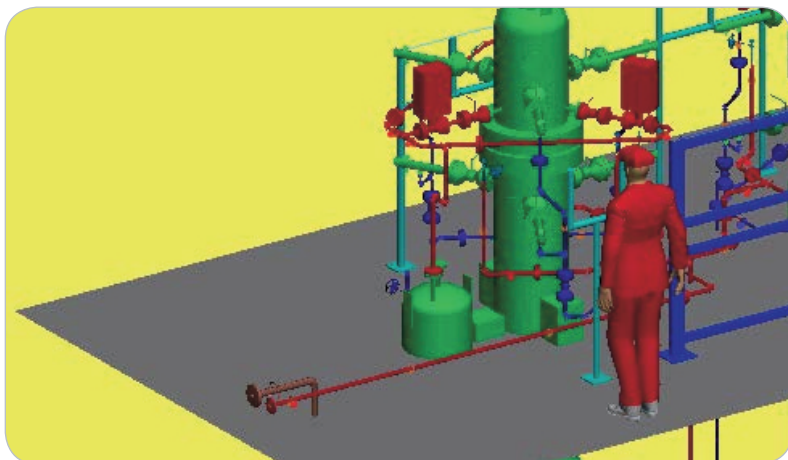
**Jet-pulse Blowback Filtration System (Gas Solid Separation System-GSS)**

Panipat, Haryana, India

**WINNER**

Pall, a global leader in filtration and purification system technologies, designed the Jet-pulse Blowback Filtration System for the Panipat Refinery in Haryana province, India. The INR 55 million project was fast-tracked, with all engineering deliverables such as general arrangement drawings, isometrics, and bill of materials to be completed within six weeks. Pall opted to use AutoPLANT Piping for the complex piping layout. As a result, piping deliverables were ready within two weeks of the start of modeling.

AutoPLANT Equipment allowed designers to meet requirements for nonstandard, customized equipment and customized isometric symbols. Pall also saved time using AutoPLANT's deliverables and built-in libraries. Overall, Bentley solutions reduced man-hours by nearly 70 percent.

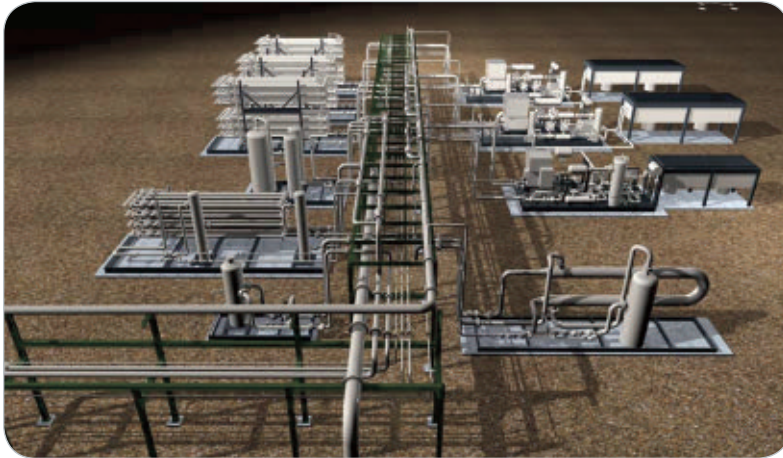


2013 WINNER

Pan American Energy L.L.C.  
**Modularization of Facilities**  
Comodoro Rivadavia, Argentina

Pan American Energy is the second largest oil and gas producer in Argentina. This USD 25 million project standardized and modularized the design and engineering of oil batteries at Cerro Dragon Oil Reservoir in southern Argentina. The modular design provided Pan American Energy with the necessary flexibility to cover a wide range of operations, which is indispensable to the dynamic exploitation of its oil field.

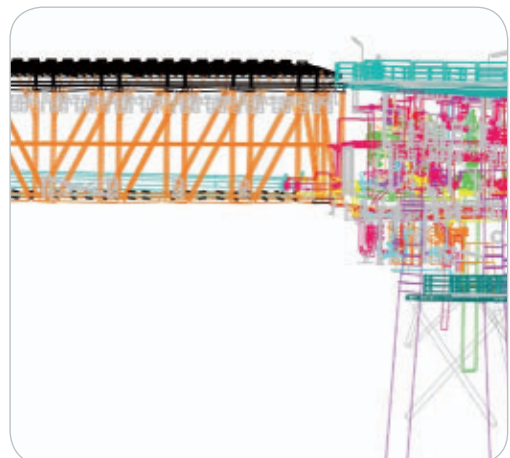
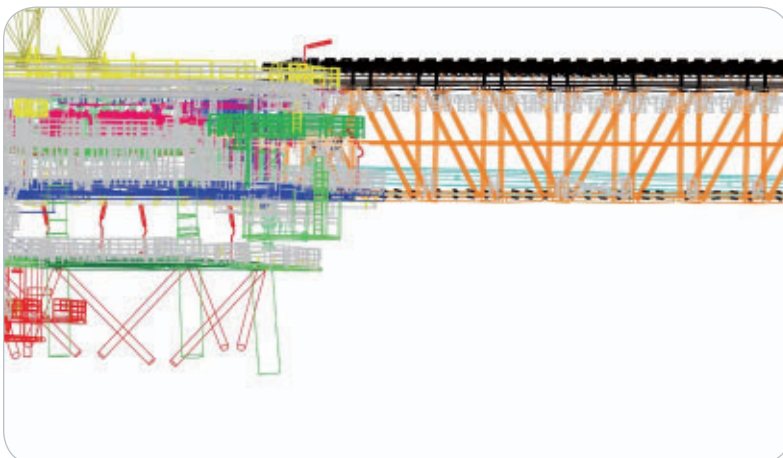
AutoPLANT and ProSteel provided the strategic set of tools supporting a multidisciplinary team of in-house and contractor professionals. Five batteries were built and installed between 2006 and 2009, and engineering time was reduced by 80 percent (7,000 hours), equivalent to 3 percent of the budget (USD 250,000) for each battery. Construction time was reduced 30 percent, and a smaller field staff reduced injuries by 30 percent.



Plant Design Engineers Sdn Bhd  
**Iron Duke**  
Sireia, Malaysia

Plant Design Engineers completed an oil and gas platform in Malaysia using an as-built intelligent 3D model for planning and coordination. Because the site posed physical and operational requirements, 100 percent coverage of the project area was required.

The project team implemented AutoPLANT to design a solution for the logistical and POB limitations for on-site personnel. The team also used existing design drawings in areas where a 3D laser could not capture images.





# PROCESS MANUFACTURING

Plant Design Engineers Sdn Bhd

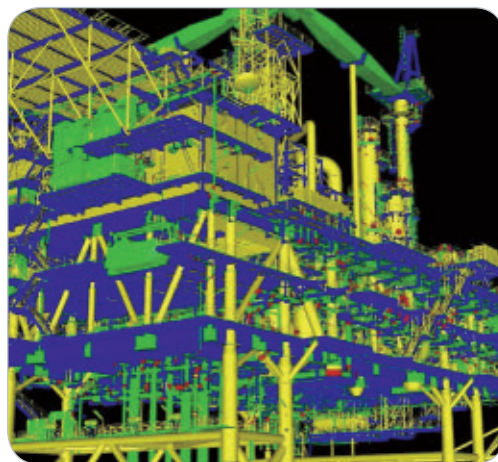
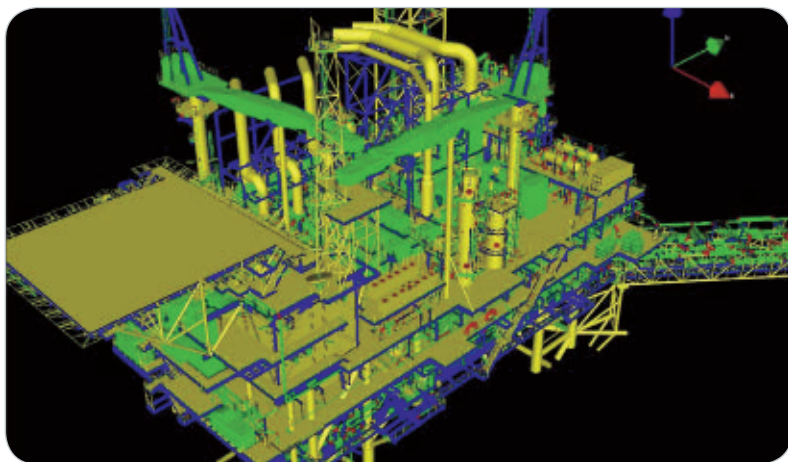
**Talisman-BRA-ASBUILT**

Kuala Lumpur, Malaysia

**FINALIST**

Plant Design Engineers was commissioned to provide an as-built 3D model of this project in Malaysia using AutoPLANT.

In concert with Bentley software, the 15-member project team used existing structural, mechanical, and piping drawings in certain areas where obstacles prevented the team from erecting scaffolding to perform scans.



2008 FINALIST

PMP Ltd.

**Isomerization Unit, Syzran Refinery**

Syzran, Russia

As PMP planned an isomerization unit for the Syzran Refinery in Syzran, Russia, the company needed to address some complex engineering problems and find the best design for the unit and its pipe insulation. The isomerization unit converts linear molecules to higher-octane branched molecules for blending into gasoline or feeding to alkylation units.

PMP used four AutoPLANT applications to devise a comprehensive yet simple design solution for the isomerization unit and its components. The successful project is an example of PMP's designs based on the use of up-to-date technologies. The company nurtures business relationships with leading licensors in Europe and the United States as well as with leading institutes of Russia.



## PROCESS MANUFACTURING

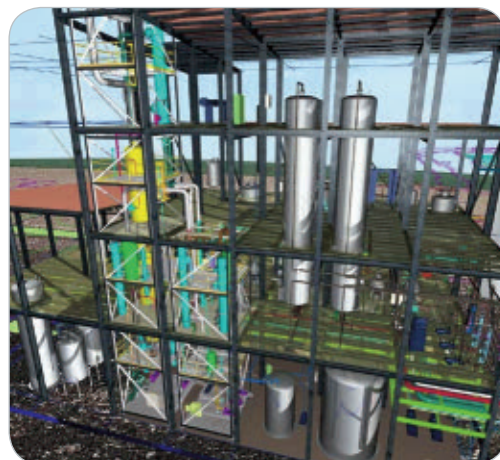
Process Automation Concepts, Ltd.

**Nation's Largest Biodiesel Plant**

Clay Pool, Indiana, United States

Developing a prototype for an integrated soybean-based biodiesel plant was this project's goal. Process Automation Concepts' specific responsibility was to convert German P&IDs to ISA standards and assist with building layout and equipment arrangement. The project team also had to provide instrumentation loop and location drawings and build a 3D model of the entire biodiesel unit – all in 16 weeks.

The short time frame made it impossible to conduct traditional project review meetings. It became clear that nontraditional methods of project design and review would be required to satisfy project goals. The project team deployed AutoPLANT to electronically transmit design data in real time. Changes affecting P&ID, the 3D model, and instrument information were made in one location, saving the project team time in data verification.



**FINALIST**

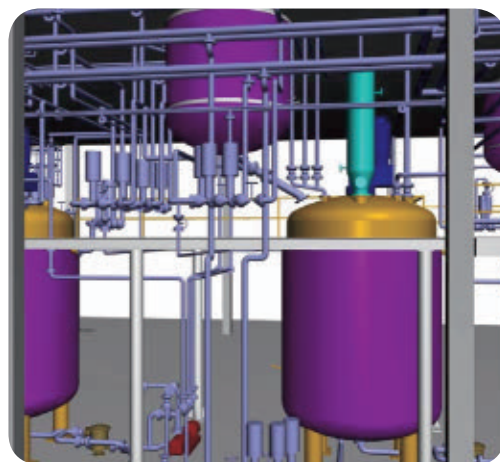
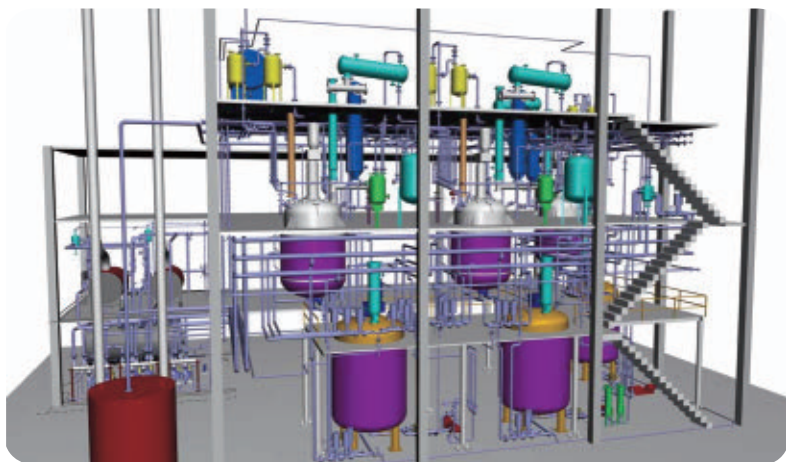
Profarb Grupa Chemiczna Sp. z o.o.

**Installation for Alkyd Resin Production**

Smolensk, Russia

Profarb Chemical Group provides turnkey development, manufacturing, installation, and commissioning of chemical equipment. For this PLN 7.1 million project in Smolensk, Russia, Profarb designed the installation of an alkyd resin production facility with four reactors totaling 6.3 cubic meters in capacity. The project included a heating-cooling installation with 2x580 kilowatt capacity, and control and measurement systems. Profarb prepared assembly documentation of the installation using AutoPLANT and Bentley Navigator.

Networked SQL databases on multiple workstations enabled project team members in various disciplines to review the 3D designs in Bentley Navigator and reduce the probability of encountering collisions during assembly. AutoPLANT enabled full prefabrication of installation components. Together these Bentley tools reduced the project team's estimated working time from 900 hours (traditional system) to 640 hours – a 30 percent savings.



2013 FINALIST



## PROCESS MANUFACTURING

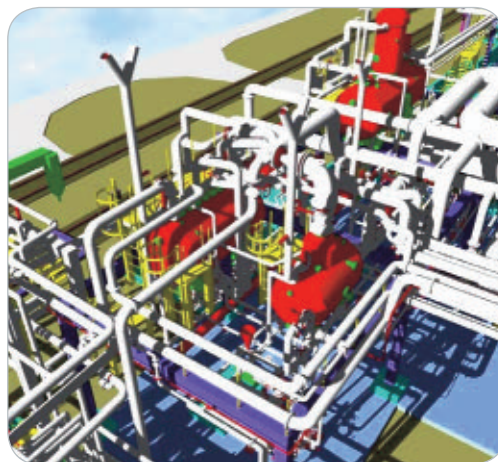
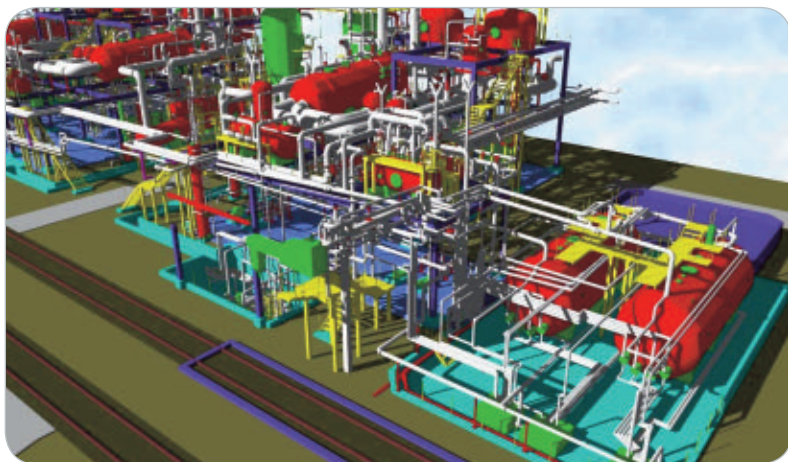
Koksoprojekt S. z o.o.

### Plant for Ammonia Catalytic Degradation and the Clauss-Method Sulfur Production in Unit of the Coke Plant "Przyjazn"

Dabrowa Gornicza, Poland

This project is a part of large coking plant being constructed in Poland. The goal is to build a modern facility for cost-effective, ecological, and waste-free utilization of ammonia and hydrogen cyanide through their catalytic degradation to nitrogen, hydrogen, and oxygen. Although Koksoprojekt handled the design process, PROZACH designed the plant in terms of equipment, piping systems, and supporting steel structures for ammonia catalytic degradation and the Clauss-method sulfur production.

The extremely complicated, multidiscipline project required excellent knowledge of industry-specific, highly innovative technology tools that could synchronize across several design areas. PROZACH engineers deployed Bentley's AutoPLANT 2D to 3D design tools that enabled the team to trace the contents of the P&ID diagrams while building the 3D model.



PT. Inti Karya Persada Teknik

### Betara Complex Development Project

Jabung, Indonesia

**FINALIST**

The USD 320 million Jambi Betara Complex Development Phase 3 & 4 Gas Plant in Jabung, Indonesia, is owned by PetroChina. As a subcontractor on the project, PT. Inti Karya Persada Teknik performed the detailed engineering of the Betara Gas Plant using Bentley tools to gain speed, accuracy, and reduce costs, and delivered PDS models as the owner mandated.

Intelligent 3D modeling was performed using MicroStation, GenerativeComponents, STAAD.Pro, ProSteel, AutoPLANT, AutoPIPE, and Bentley Navigator. The engineering team saved time by aggregating and assembling geometry from multiple software sources, and explored more design options in less time. The resulting design accuracy gave the construction team increased visibility and credibility.



2012 FINALIST

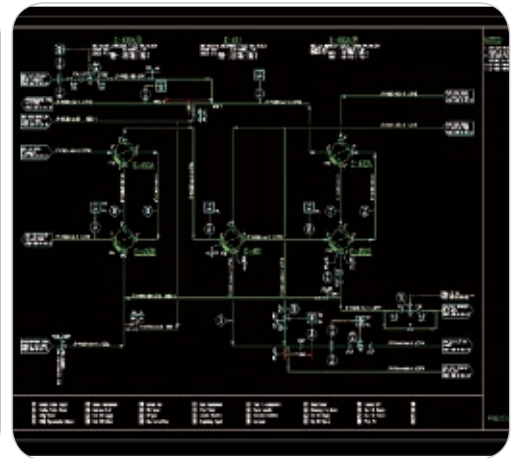
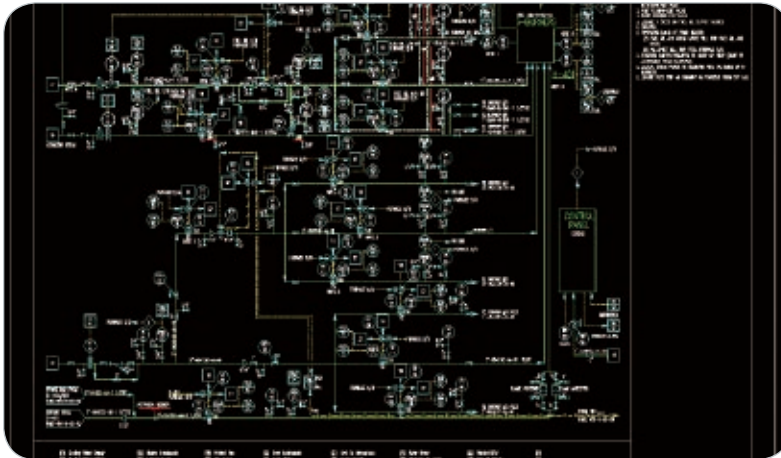
## Rishabh Engineering Services

### P&ID for Process Plant

Canada

The Hebron oil field, located approximately 350 kilometers offshore from the island portion of Newfoundland and Labrador, is being developed by a joint venture among the province's energy corporation, Chevron Canada, ExxonMobil Canada, Petro-Canada, and StatoilHydro Canada. Rishabh Engineering Services was assigned to generate intelligent piping and instrumentation diagrams (P&IDs) for seven units of the topsides refinery.

Headquartered in Baroda, Gujarat, India, and with subsidiary offices in the United States and the United Kingdom, Rishabh Engineering Services received hand-drawn P&IDs from the client. Using Bentley's AutoPLANT, the team converted the diagrams into intelligent models. The user-friendly software allowed productivity gains while maintaining consistency and accuracy. Data management and reporting capabilities enabled the efficient creation of specifications, material take-offs, and bill of materials.



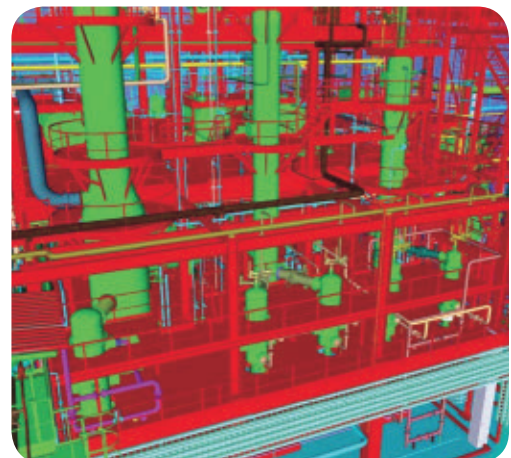
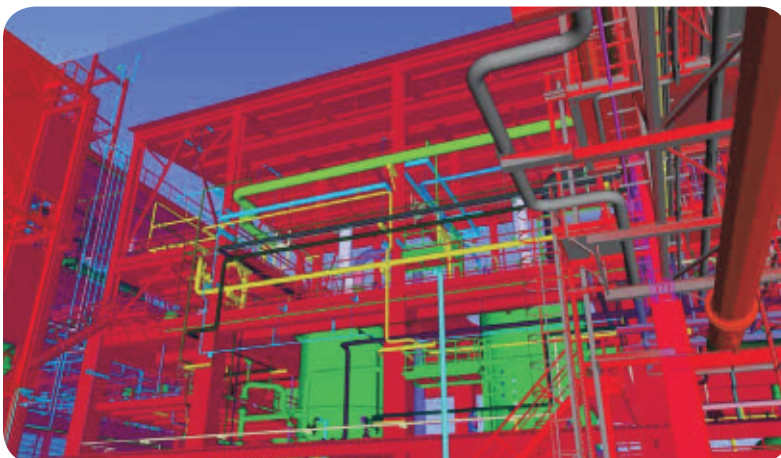
## Soyuzchempromproject

### Butadiene-styrene Thermoplastic Elastomer Plant

Voronezh, Russia

An affiliate of SIBUR, Voronezhsintezkauchuk is one of the largest manufacturers of high-quality rubber, latex, and thermoplastic elastomer in Russia. The RUB 4.5 billion Voronezh plant will produce 50,000 tons per year of butadiene-styrene thermoplastic elastomer for use in the manufacturing of polymer-modified asphalt cement. Soyuzchempromproject designed the complex of processing units, warehousing, and civil and secondary structures.

Bentley's AutoPLANT products and ProSteel were used to create a unified 3D model for analyzing the layout of equipment and structures, performing conformance testing, and issuing documentation as a complete package. The integrated model also aided in resolution of customer issues, avoidance of on-site design revisions, and field supervision in collaboration with the construction contractor. Time savings totaled 10 percent.





# PROCESS MANUFACTURING

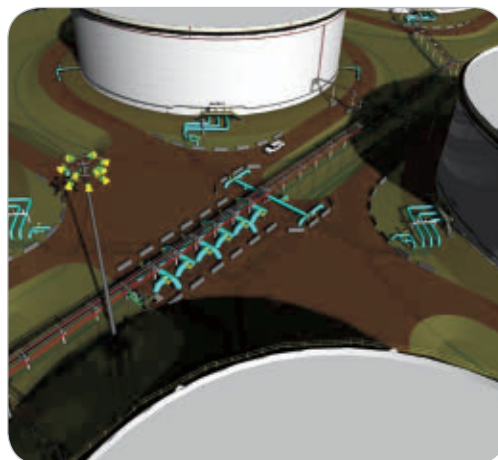
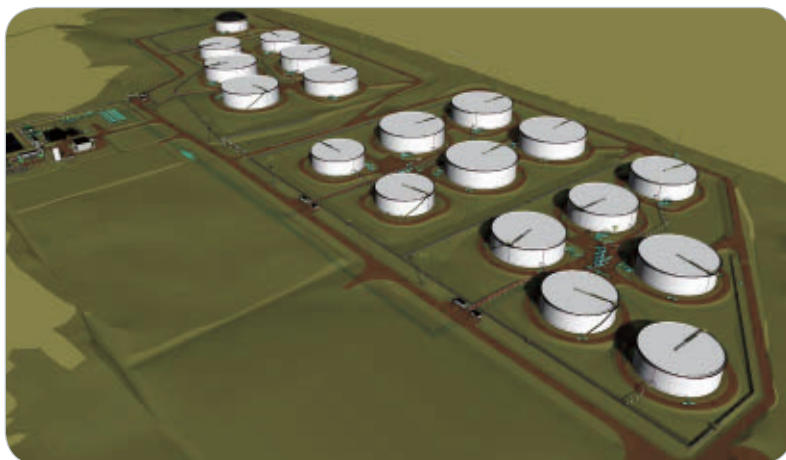
Stantec Consulting Ltd.

**Hardisty Contract Tankage**

Hardisty, Canada

Located in Alberta, Canada, the USD 635 million Hardisty Contract Tankage terminal will provide services to accumulate medium- and long-term liquid crude volumes on a fee-for-service basis. Stantec Consulting performed the detailed engineering, including identification and evaluation of cost-saving strategies, for 18 crude oil tanks and one diluent tank with total tankage volume of 7.5 million barrels.

The scope included design and development of associated equipment, facilities and infrastructure. Using STAAD.Pro, AutoPLANT, and ProSteel for civil, mechanical, and structural design enabled the firm to optimize the site layout, system hydraulics, tank density, and cut-and-fill balance on a site that undulates at various gradients from 2 to 10 percent.



Stopford Projects Ltd

**Tata Soda Ash Plant**

Winnington, United Kingdom

**WINNER**

The 19th century soda ash plant in Winnington, United Kingdom, consists of a 10-story chemical processing building covering 6,000 square meters of floor area. Stopford Projects was commissioned to conduct a structural survey as part of an ongoing asset management and maintenance strategy. The resulting intelligent 3D model enabled rapid and precise mapping of the entire structure and supported future plant maintenance.

Stopford Projects converted archival plant drawings into a 3D model and then mapped the degraded sections to create a visual representation for use in development of maintenance plans. More than 10,000 structural elements were modeled in ProSteel and 2,500 metric tons of iron pipe were modeled in AutoPLANT. The model was easily modified as site surveys reported as-built conditions, producing an adaptable tool for the client.



2011 WINNER

**WINNER**

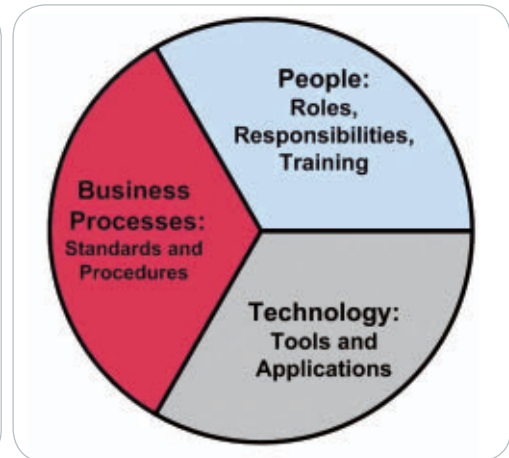
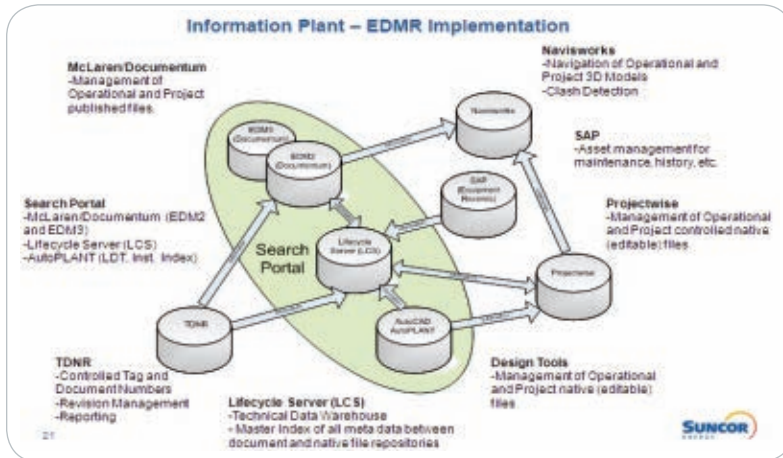
Suncor Energy Inc. (Edmonton Refinery)

**Information Plant**

Edmonton, Alberta, Canada

The Information Plant (IP) at the Suncor Energy refinery in Edmonton, Alberta, Canada, brings together the facility's technical data, engineering resource planning information, and documents in a single, reliable system supporting the day-to-day operations and maintenance decisions. The CAN \$12 million solution, involving AutoPLANT and eB Data Quality Manager (formerly ProjectWise Lifecycle Server), produced an estimated cost savings of CAN \$5.7 million the first year and about CAN \$1.6 million annually thereafter.

At the IP's core is an index of all facility documents and tagged assets. Cross-referencing physical assets and associated information supports critical business processes such as change management and project turnover. The central index facilitates search and retrieval of technical information across all platforms. Progressive deployment of the IP began in 2007. Since full implementation in 2009, the IP has reduced time spent finding and viewing information, and thus reduced safety risks.



2013 WINNER

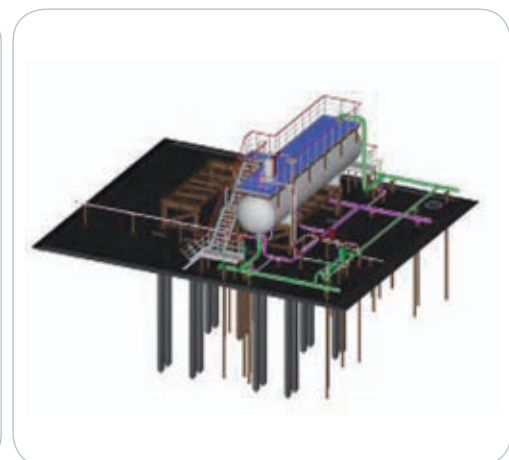
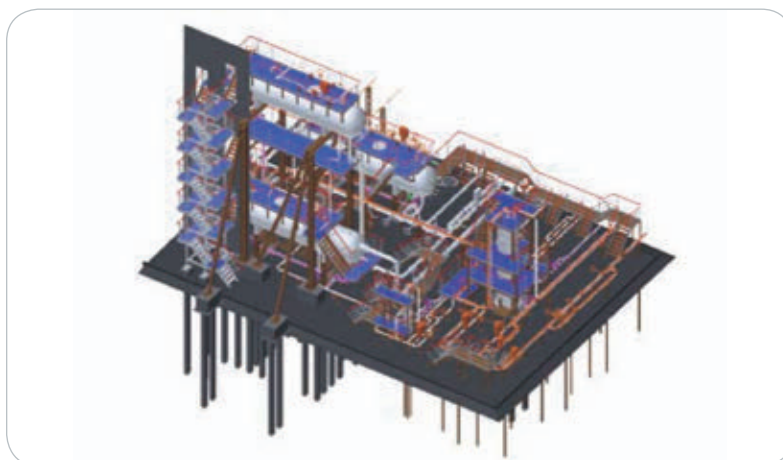
Surgutneftegaz, JSC

**Construction of Rogozhnikovskiy's Oil Field**

Surgut, Russia

Surgutneftegaz is a Russian oil company involved in oil and gas production and exploration, gas processing, power generation, and output and marketing of petroleum products, petrochemicals, and gas products. Construction at the Rogozhnikovskiy oil field involved design and installation of facilities for preliminary preparation of oil and gas prior to transport to a central collection point.

For similar projects, project teams had developed separate designs for each installation. For this project, project team collaboration enabled integrated design using AutoPLANT Piping, AutoPLANT Equipment, AutoPLANT P&ID, Bentley Vision, and ProSteel. Bentley Navigator was used to review and analyze the 3D model and detect and resolve clashes, significantly reducing project optimization time.





# PROCESS MANUFACTURING

Wink Companies, LLC

## Ergon Propylene De-Asphalting Unit

Vicksburg, Mississippi, United States

To design a ROSE unit based on KBR's process design package and preliminary plot plan, the Wink team utilized AutoPLANT for process, piping, mechanical, electrical, instrumentation, civil, and structural engineering. Deliverables also included P&IDs, isometrics, orthographic drawings, foundation and paving drawings, structural steel drawings, instrument drawings, and electrical drawings.

Because the USD 80 million project in Vicksburg, Miss., was fast-tracked, it necessitated constant communications among engineering disciplines, the client, and third-party contractors. AutoPLANT allowed team members to collaborate on design, create an integrated model, visualize and fix problems, and view work status in real time.



Y&V Ingeniería y Construcción C.A.

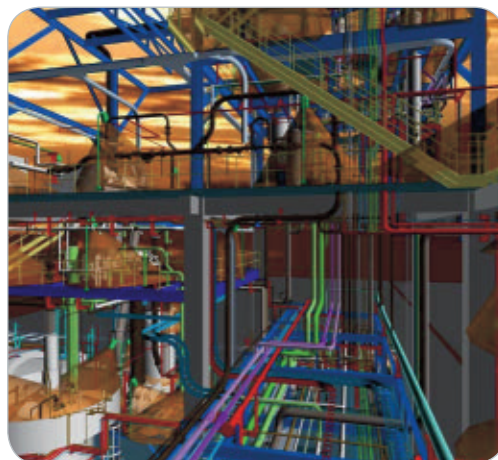
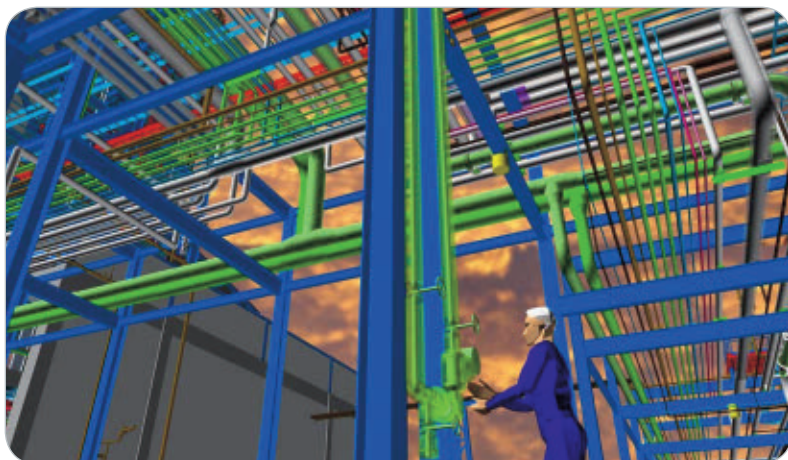
## EPC – High-Density Polyethylene Plant Expansion

El Tablazo, Venezuela

**FINALIST**

Y&V Ingeniería y Construcción assumed the engineering, procurement, construction, installation, commissioning, and start-up of this project, whose objective was to expand high-density polyethylene production from 16 thermal and hydraulic for varied average grades up to 20 thermal and hydraulic for grade-specific 7000F polyethylene to maximize existing facilities usage.

The complex multidiscipline project involved maximizing the use of existing facilities and integrating traditional standards with new technologies and materials. AutoPLANT allowed the firm to improve workflows that included defining volume areas and levels in buildings, designing piping components, and checking clashes using Bentley Interference Manager.



2008 FINALIST

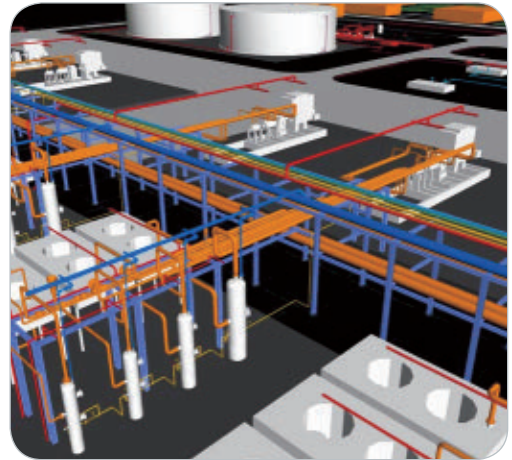
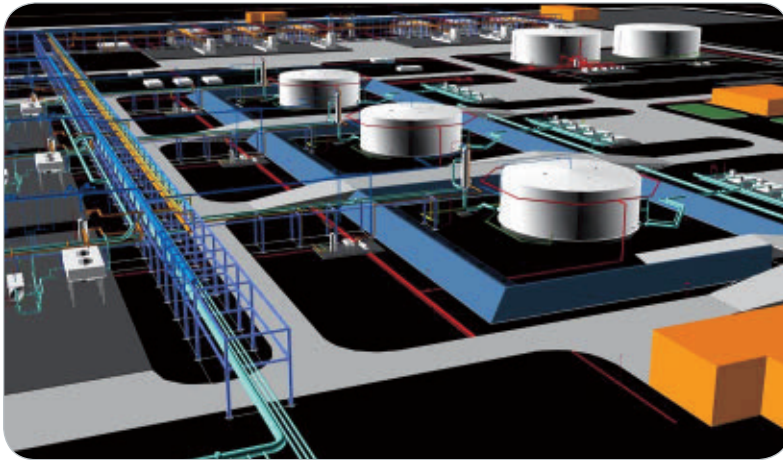
Y&V Ingeniería y Construcción C.A.

### FEED-Integrated Development of Infrastructure Area for the Rational Exploitation of Hydrocarbons

Zulia, Venezuela

The main challenge of this project was to create a better way of communicating between the engineering team and the owners by allowing all parties to visualize multiple what-if scenarios for optimal plant functionality at a minimal cost. By deploying AutoPLANT, the project team overcame these challenges.

The software increased information accuracy and created areas and models according to the work breakdown schedule to satisfy process, utilities, and fire-fighting requirements. The software allowed graphic 3D representation of the main equipment location and piping arrangements. Overall, design man-hours were reduced at a 2.5 to 1 ratio when compared to traditional 2D design.



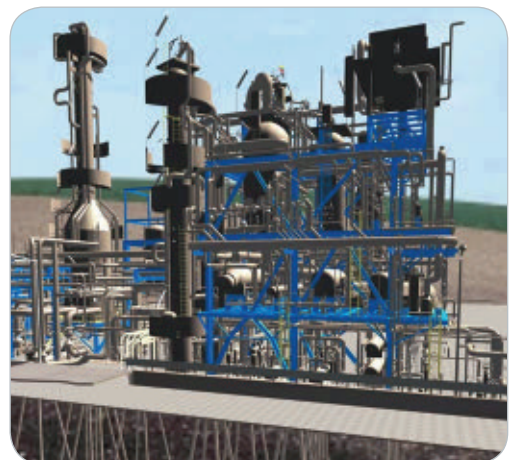
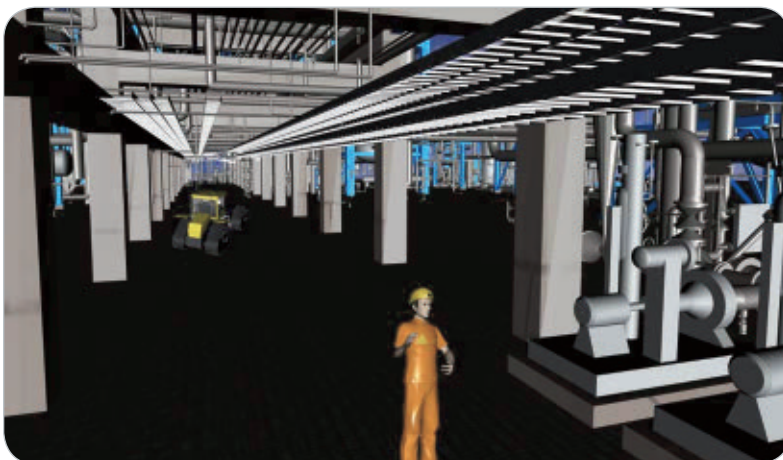
Y&V Ingeniería y Construcción C.A.

### MTBE Plant Conversion

Jose, Venezuela

The Methyl Tert-Butyl Ether plant located in Jose, Venezuela, was converted to an iso-octane plant in response to environmental and health concerns. Y&V Ingeniería y Construcción executed the complex design, which converted the existing etherification section into a dimerization unit, and added a new hydrogenation unit and debutanizer column. This work was executed with the plant in operation.

AutoPLANT created 3D models, produced orthographic and isometric drawings, and generated materials reports. The design team used an integrated 3D model to execute more than 600 lines of P&ID and 60 pieces of equipment in a confined area – including the 142-foot-high debutanizer column.





# PROCESS MANUFACTURING

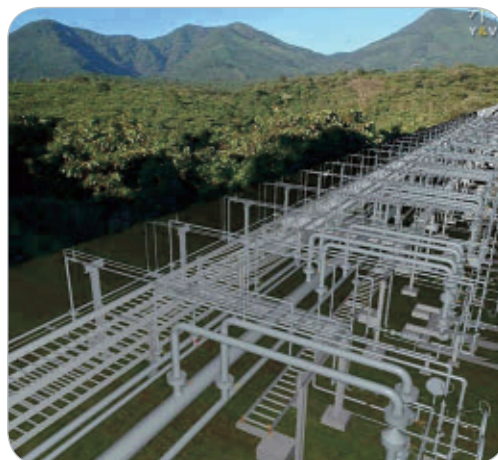
Y&V Ingeniería y Construcción C.A.

## Surface Facilities and New Cluster, Drilling Plan

San Diego de Cabrutica, Venezuela

Y&V Ingeniería y Construcción was the EPC contractor for surface facilities associated with expansions and new clusters in the drilling plan located in San Diego de Cabrutica, Venezuela. During this fast-track project, the piping discipline used AutoPLANT to optimize the design and integrate with other disciplines such as process, structural, electrical, and instrumentation.

The 3D design included nine clusters composed of 99 wells. Given the similarity among several wells, the piping discipline created a well model that could be duplicated and adapted according to the needs of each cluster, dramatically reducing the design time. AutoPLANT and the firm's methodology of integrated electronic modeling allowed the team to overcome challenges and execute the project successfully.



YORK International/A Johnson Controls Company

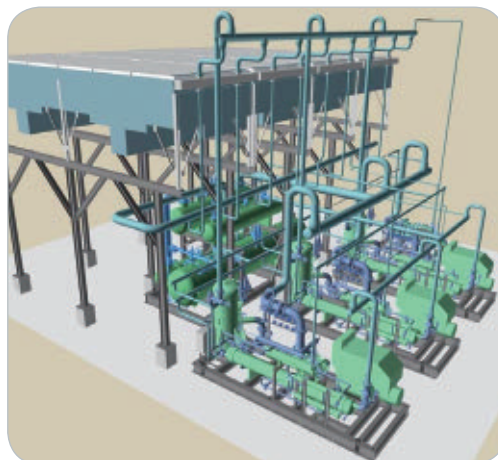
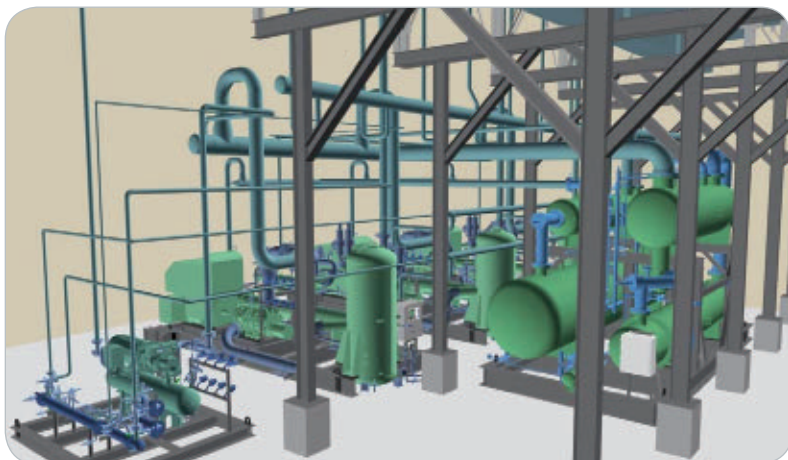
## Renewable Energy Corp., Moses Lake Expansion

Moses Lake, Washington, United States

**FINALIST**

The USD 7 million Moses Lake Expansion project doubled Renewable Energy Corp.'s capacity to produce polysilicon at its Washington state facility. The project is comprised of two large brine chilling systems supplying low-temperature refrigeration using environmentally friendly R-507, a nonozone depleting refrigerant.

YORK's use of AutoPLANT provided seamless integration and streamlined workflows among engineering design, supply chain management, and the fabrication department. In addition, client deliverables have been improved because the client can see how the new installation will impact existing plant equipment and structure. Providing 3D models to perform virtual tours also eliminates installation and maintenance interferences prior to equipment fabrication and delivery.



2007 FINALIST

**WINNER**

Zeton Inc.

**Modular GTL Commercial Demonstration Plant**

Aracaju, Brazil

Zeton designed and built the world's first modular gas-to-liquids (GTL) commercial demonstration plant using Compact GTL's mini-channel reactor technology. The USD 20 million plant incorporated all aspects required for commercial application in treating gas at remote and offshore oil fields. Access to a real-time 3D model during fabrication improved accuracy and reduced rework.

AutoPLANT provided the robust 3D plant modeling solution required to scale GTL technology from pilot to commercial and allowed team members on four continents to work together to resolve issues related to design of a compact, modular GTL plant. In addition to AutoPLANT, the 3D design was completed using ISOGEN for isometric piping drawings, AutoPIPE for pipe stress analysis, and ProStructures for structural steel design.

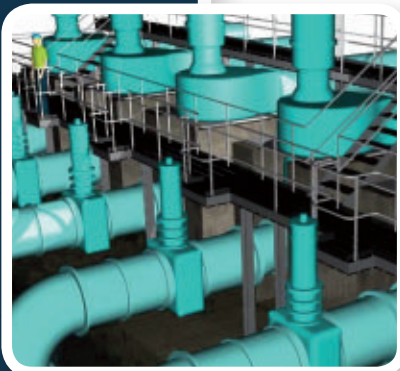
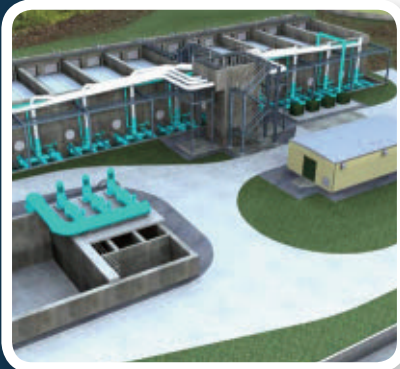


2012 WINNER









# Water and Wastewater Treatment Plants

These AutoPLANT water treatment projects provide unmatched capabilities in visualization, design review, and interference detection.



# WATER AND WASTEWATER TREATMENT PLANTS

Aquatech International Corporation

**Aquatech FGD ZLD**

Brindisi, Fusina, La Spezia, Sulcis, and Torrevaldaliga, Italy

Italy's largest power company, Enel had five coal-fired plants that discharged flue gas desulfurization wastewater into the sea. To comply with environmental regulations, Enel chose a two-part solution: feed pre-scrubbers with fresh and recirculated waters and install zero liquid discharge (ZLD) plants, an automated system that produces industrial-grade soft water and high-purity distillate for use in the power plant.

As the EPC contractor, Aquatech supplied, installed, and commissioned the ZLD plants. AutoPLANT enabled the project team to design one plant and port the design to the other plants, which helped compress the schedule as well as facilitate reviews with process engineers. Bills of materials were easily consolidated for purchasing power and then split for delivery to separate sites. Visual model reviews overcame any language barriers.



Atkins

**Bolton Wastewater Treatment Works**

Bolton, United Kingdom

**WINNER**

The Bolton Wastewater Treatment Works project was a USD 78.5 million improvement scheme that includes significant refurbishment work on the existing plant. Construction work consisted of two new conventional hopper-bottomed primary settlement tanks, a new ferric dosing plant, a new sludge treatment facility, and four new flat-bottomed secondary settlement tanks, which, at 46 meters in diameter, are the largest ever to be constructed for United Utilities.

The four new settlement tanks were built on an adjacent greenfield site and were subject to planning approval. The 3D images of the proposed settlement tanks enabled by MicroStation and AutoPLANT helped gain planning approval on the first attempt. Atkins has also used its 3D modeling experience to build a database of best-practice designs that meet the U.K.'s AMP4 requirements for water treatment plants.



2007 WINNER

# WATER AND WASTEWATER TREATMENT PLANTS

**WINNER**

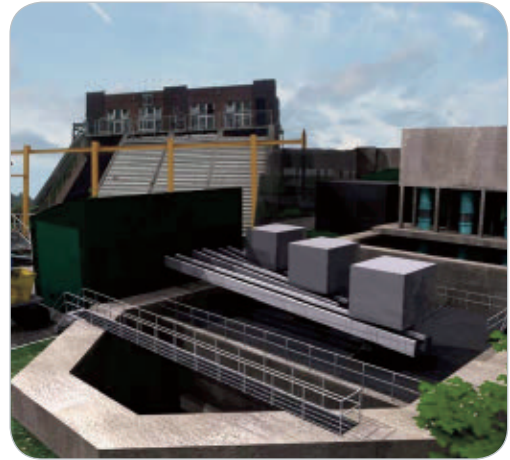
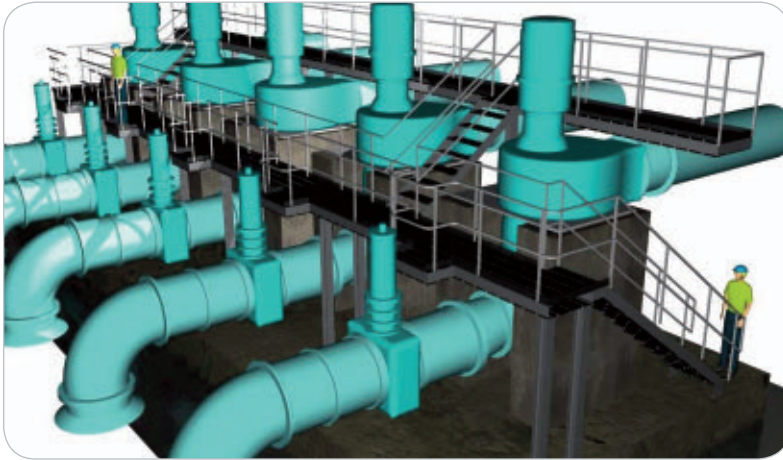
Atkins

## Wastewater Treatment Improvement Projects

Stockport, United Kingdom

Atkins used 3D design on the Milnthorpe Wastewater Treatment Works, part of the GBP 10 million Arside Improvements Project. The works consisted of a new inlet works, compact activated sludge plant tanks, selector tank with combined distribution chamber, sludge treatment facility, and submersible pumping stations.

AutoPLANT enabled improved rescopeing for safety aspects, easier identification of risk areas and major constructability issues, identification of areas for cost savings from realignments, and reduced on-site delays. The Stockport design was also enhanced by AutoPLANT in routing pipe work, allowing the firm to prove line and level while negotiating a plethora of existing site services.



2006 WINNER

**FINALIST**

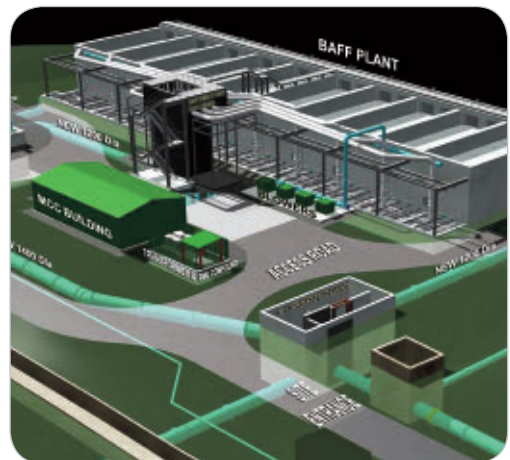
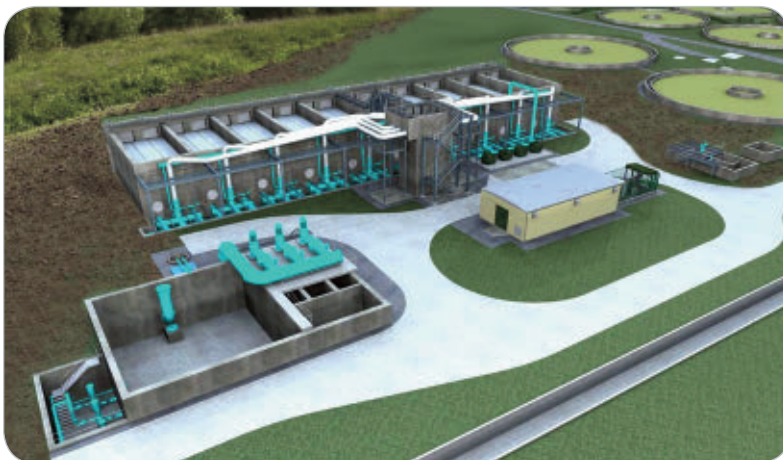
Atkins

## Wigan Q Project

Wigan, United Kingdom

Joint venture partners Galliford Try, Costain, and Atkins teamed with United Utilities to deliver new and refurbished water and wastewater treatment projects throughout northwestern United Kingdom. As part of a five-year, GBP 3 billion asset management plan, the alliance developed the GBP 13.6 million Wigan wastewater treatment plant. The biological aerated flooded filter improved process flexibility and compliance with tighter standards.

Using MicroStation, Bentley Navigator, and AutoPLANT, Atkins modelers created each element in various configurations to enable designers to refine the layout for cost-effective operation and sustainability. The software allowed designers to quickly and easily review equipment layouts, analyze possible pipework clashes, and assess lifting and maintenance issues. As a result of constructability reviews, costs were forecasted to be 15 percent below budget.



2009 FINALIST



# WATER AND WASTEWATER TREATMENT PLANTS

CDM

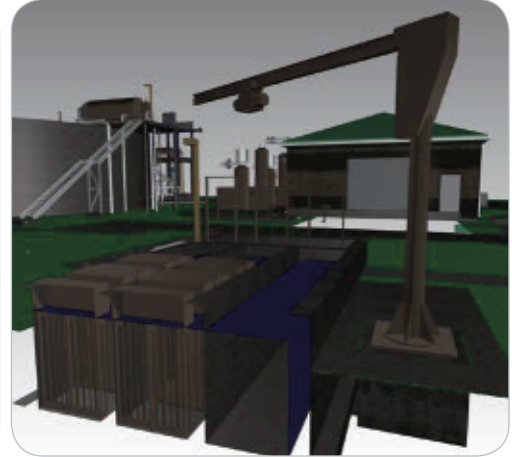
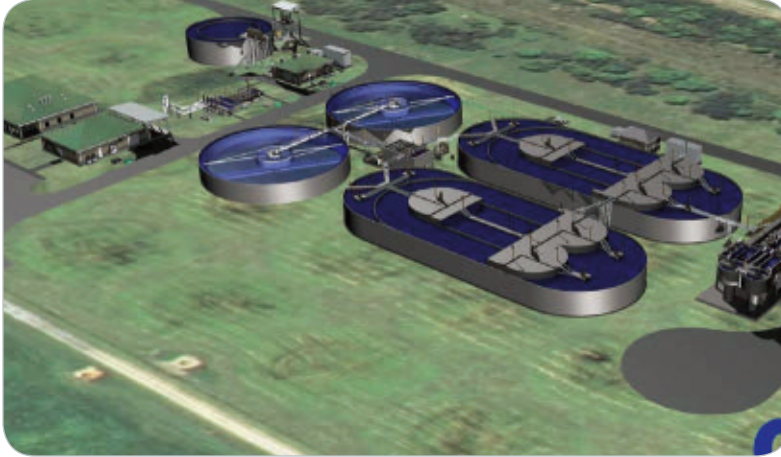
## Arbennie Pritchett Water Reclamation Facility

Fort Walton Beach, Florida, United States

WINNER

Ocala County teamed with CDM to design and build a state-of-the-art wastewater treatment facility. The Arbennie Pritchett water reclamation facility will serve a population of 181,000 in the Florida panhandle, treating 10 million gallons of wastewater per day to the stringent Florida Department of Environmental Protection standards.

AutoPLANT, STAAD.Pro, and ProjectWise allowed CDM to incorporate intelligent 4D design into the 3D facility models, providing a lasting platform for efficient operations and maintenance. The 3D/4D approach allows for the 3D models and intelligent data to continue through the full lifecycle of the facility.



2008 WINNER

CDM

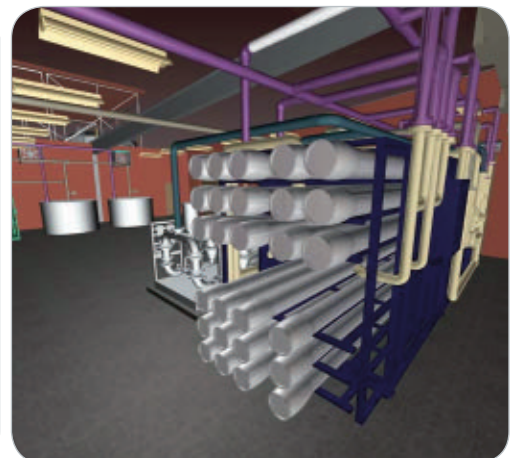
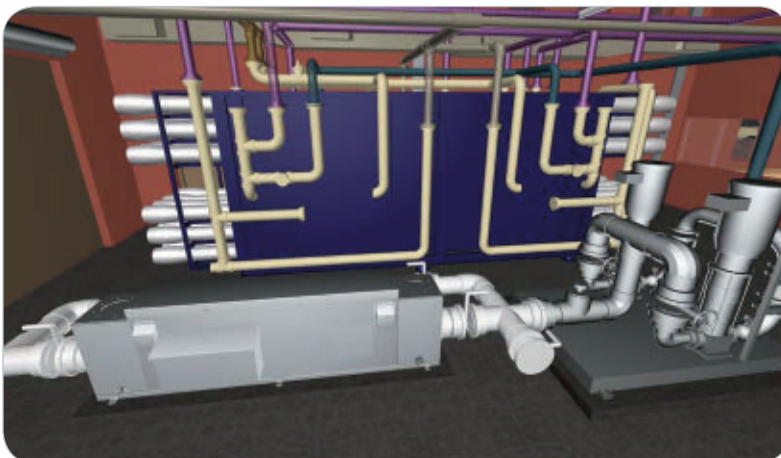
## Casa Grande Water Recovery and Reuse Project

Casa Grande, Arizona, United States

WINNER

Located in Casa Grande, Ariz., this design/build project developed a water recovery treatment system that recycles 80 percent of the production wastewater from a snack-food facility to deliver water that meets federal primary and secondary drinking water standards. CDM's design alternative saved USD 2 million from the original planned treatment system.

The design incorporated the technology for water treatment and solids management in a compact space, with 180-foot-diameter concentric steel tanks, individual sun canopies, and a LEED Silver-certified control building. CDM's team of experts worked in a managed environment for plant information using AutoPLANT and ProjectWise.



2009 WINNER

## FINALIST

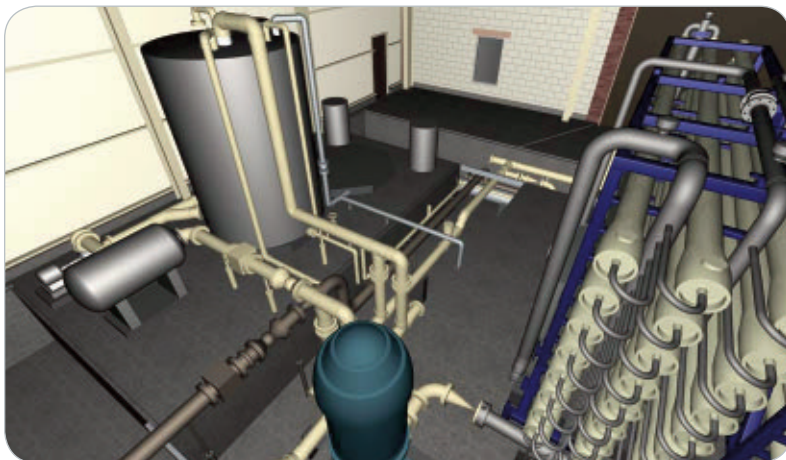
CDM

### St. Augustine LPRO Water Treatment Plant

St. Augustine, Florida, United States

The increasing maintenance of an aging lime-softening water treatment plant represented a financial and reliability risk for the City of St. Augustine, Florida. Consequently, the city proposed the construction of a low-pressure reverse osmosis (LPRO) water treatment facility that will use the brackish water of the Florida aquifer as its source.

CDM used ProjectWise to allow engineers and designers to work more closely in a structured and managed environment, creating a central repository for all related project data. In addition, its use of AutoPLANT leverages innovative techniques to improve and enhance its design processes, and providing measurable increases in team collaboration.



2007 FINALIST

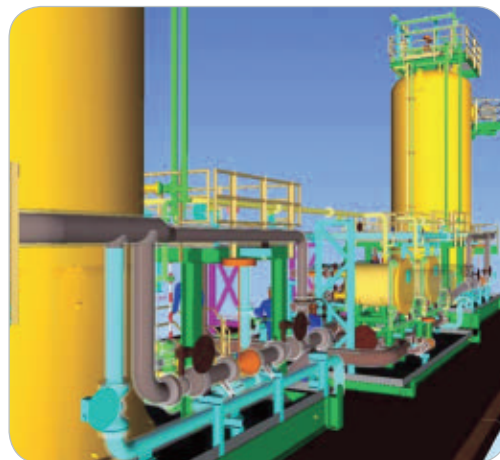
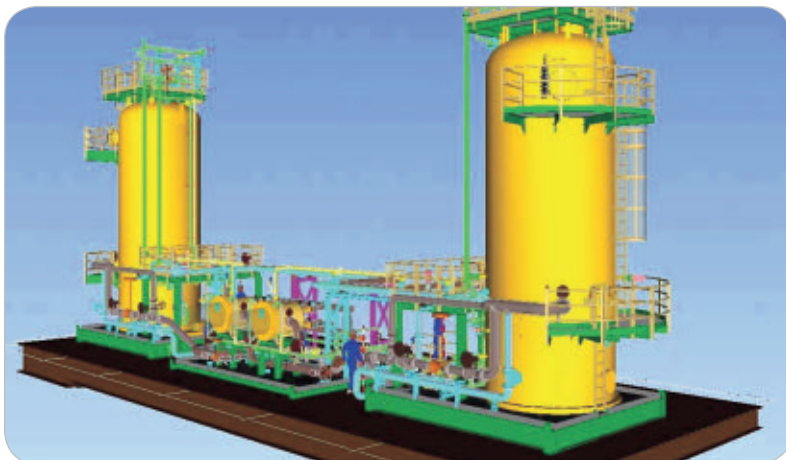
### Frames Process & Energy Systems India Pvt. Ltd.

#### Produced Water Treatment Package for Pre-salt FPSOs

Brazil

Frames Process & Energy Systems India (Frames) delivered a produced water treatment package for a pre-salt floating production, storage, and offloading unit off the coast of Brazil. Consisting of two hydrocyclone vessels, two gas flotation vessels, and associated pumps, the package was skid-mounted to save time during erection. Frames used Bentley solutions to devise a combination of three skids and interconnected piping that met the space and weight constraints.

AutoPLANT Piping, ProSteel and STAAD.Pro made it easy to study different solutions. With the equipment and piping in a single model, design changes were verified in context. When a selected beam was unavailable, STAAD.Pro enabled the quick selection of an alternative, as well as the adjustment of dimensions and foundation. The 3D model also prevented rework during fabrication and reduced on-site erection time.





# WATER AND WASTEWATER TREATMENT PLANTS

Gippsland Water

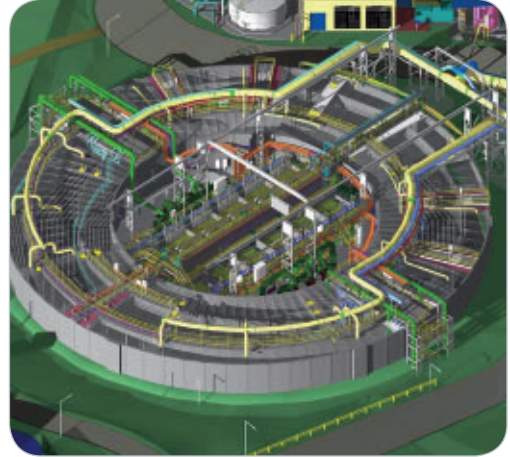
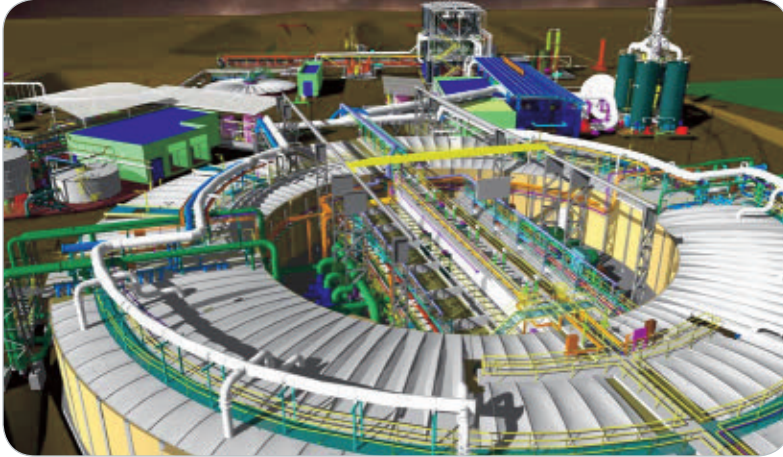
**Gippsland Water Factory**

Maryvale, Australia

**FINALIST**

The Gippsland Water Factory in Victoria, Australia, provides a sustainable solution for treating up to 35 million liters per day of domestic and industrial wastewater. The innovative technology eliminates raw wastewater discharge, conserves chemicals and energy, and generates high-quality recycled water to save about 3 billion liters of fresh water each year. The capital cost of the project to Gippsland Water was AUD 240 million.

The project team used AutoPLANT and ProSteel to deliver the project on time and on budget. The site was divided into 65 3D models that could be brought into a single view. AutoPLANT was used to generate 1,000 isometrics with estimated savings of five hours per isometric. The solutions enabled efficient drafting and engineering, construction procurement, 3D visualization and clash detection, and as-built model delivery for lifecycle maintenance.



2011 FINALIST

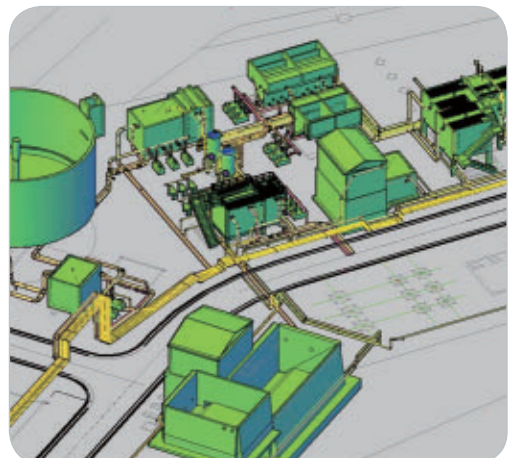
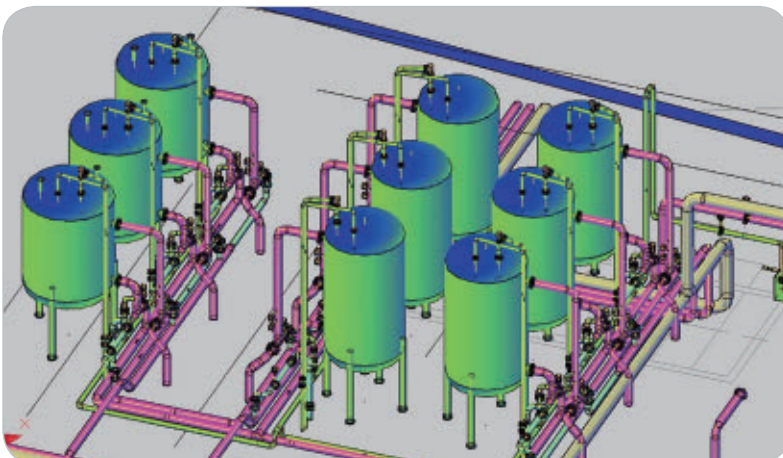
HDO Technologies Limited

**Effluent Treatment Plant CEMP Phase II**

Kochi, India

Bharat Petroleum Corporation is expanding production capacity and modernizing facilities for producing auto fuels. HDO Technologies was awarded the engineering, procurement, and construction contract for an effluent treatment plant in Kochi, India. In addition to the design of the plant, several pieces of equipment were supplied by HDO.

Using AutoPLANT enabled concurrent modeling of equipment, piping, and structures. The software also aided HDO in clash detection, estimating material take-offs, and generating isometric and general arrangement drawings. This saved a considerable amount of time within a compressed schedule.



# WATER AND WASTEWATER TREATMENT PLANTS

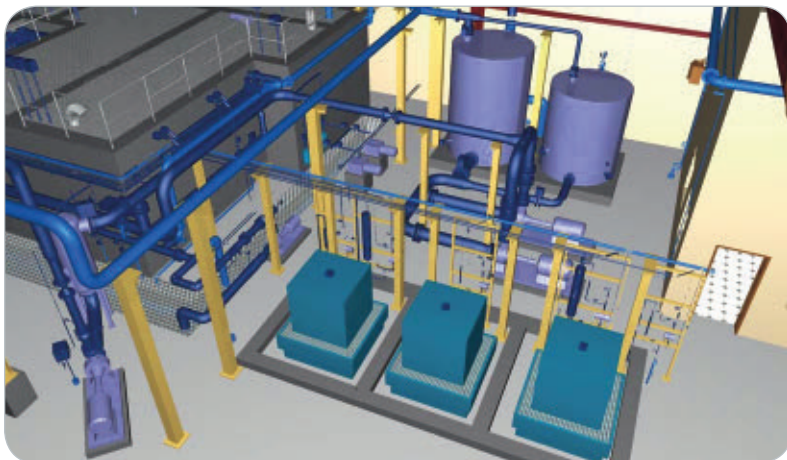
Jordan, Jones & Goulding, Inc.

## Hallsdale-Powell Utilities District – Norris Lake Water Treatment Plant

Norris Lake, Tennessee, United States

Jordan, Jones & Goulding designed the USD 20 million Norris Lake Water Treatment Plant with a rated capacity of 4 million gallons per day. The project includes a new raw water pump station/intake structure, treatment building, clearwell, lagoons for solids handling, and an on-site sodium hypochlorite generation system.

The design team used AutoPLANT software to produce intelligent P&IDs and 3D models of the new treatment building as well as other facilities. By preparing intelligent P&IDs using the external database, the firm could compare the 2D elements to the components found in the 3D models, reducing errors and omissions.



MECON Limited

## 100 MLD SWRO Desalination Plant

Chennai, India

This USD 120 million seawater reverse osmosis desalination plant will provide 100 million liters per day of potable water to the people of Chennai, India. MECON prepared structural, piping, and equipment general arrangement drawings on a tight schedule. The project required complex pipe routing, with multiple engineering disciplines involved in the integration of structural, piping, and equipment designs.

MECON performed 3D modeling using the well-defined and properly structured piping component library in AutoPLANT Piping, and the extensive equipment library in AutoPLANT Equipment. The resulting 3D model was used for stress analysis in AutoPIPE. AutoPLANT and Structural Modeler produced the structural arrangement drawings, and Bentley Navigator facilitated visualization of the integrated 3D model and elimination of interferences.





# WATER AND WASTEWATER TREATMENT PLANTS

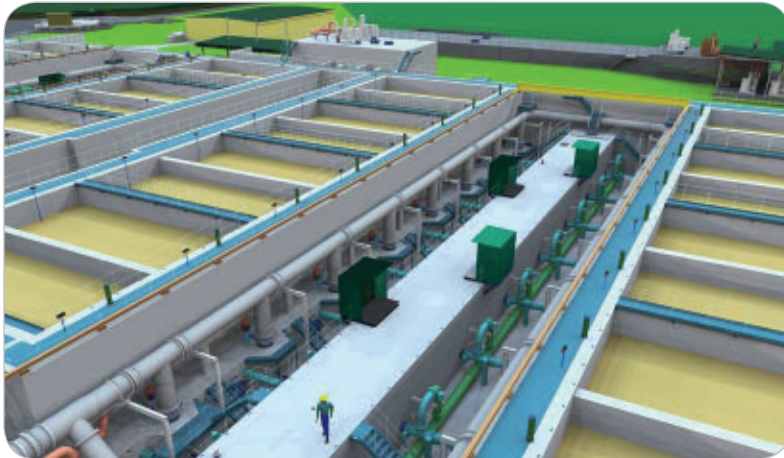
## Melbourne Water

### Eastern Treatment Plant Tertiary Upgrade

Melbourne, Australia

The AUD 418 million upgrade of Melbourne Water's Eastern Treatment Plant in Melbourne, Australia, will add an advanced tertiary treatment plant to produce 708 megaliters per day of high-quality recycled water for non-potable applications. The plant will also improve treated effluent quality at the ocean discharge outfall to benefit the marine environment. Automated piping isometrics alone saved about 8,000 man-hours.

Specialist team members on four continents worked concurrently to create 175 civil, structural, electrical, mechanical, and piping models that could be referenced in a single view and coordinated by the on-site design team. Creating intelligent P&IDs using AutoPLANT P&ID, integrated structural design using ProSteel, and 3D modeling of yard services in a single model optimized layouts, minimized clashes, and allowed interfaces to be managed.



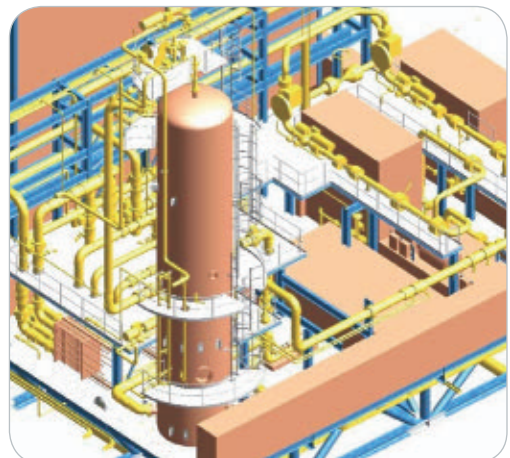
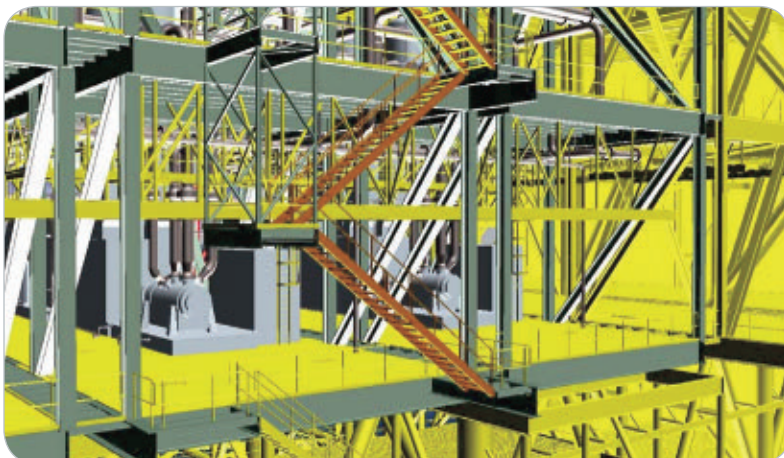
## MWH Taiwan

### Nan-Zhi Wastewater Treatment Plant

Kaohsiung City, Taiwan

This USD 6 million wastewater plant project in Kaohsiung City, Taiwan, included three systems: wastewater treatment, cooling water circulation, and LPG tank. The plant, which replaces an existing plant that was decommissioned and removed, had to be designed and constructed within 11 months of the old plant's removal.

After adopting AutoPLANT, MWH Taiwan experienced three major workflow improvements: accurate BOMs that reduce spare parts and cut materials costs; the automatic generation of isometrics, which cuts the time required to generate project deliverables by 30 percent; and 3D designs that pinpoint potential design issues related to operation and maintenance.



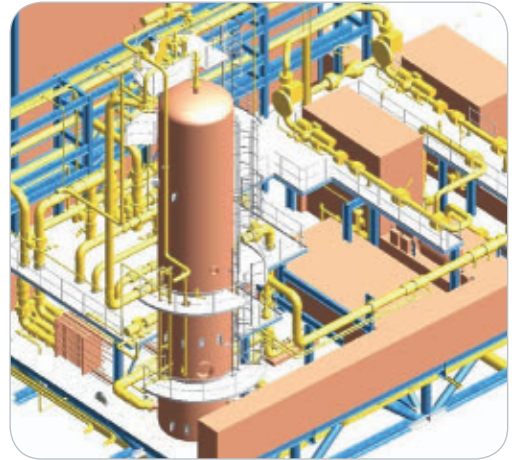
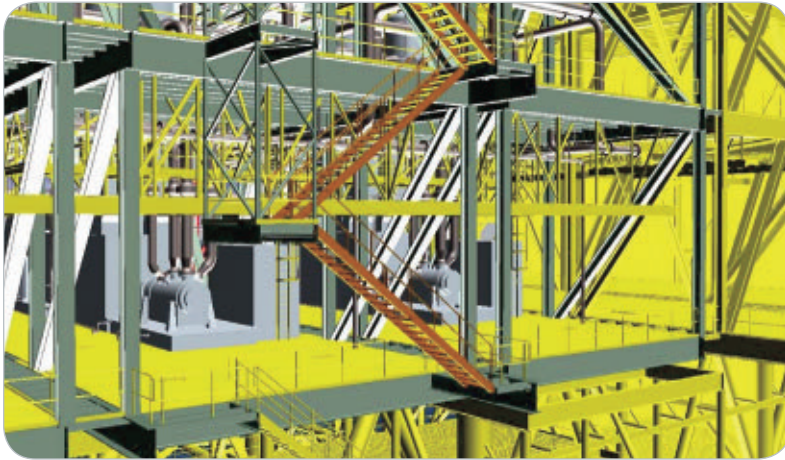
Saankhya TechNeering Private Limited

## Water Treatment Plant for an Oil and Gas Project

Bangalore, India

This project encompassed the modeling of pipe supports, structural framework, building ducting, and cable trays to complete a water treatment plant in Bangalore, India. Saankhya engineers used AutoPLANT to perform the detailed design, 3D modeling, and 2D detailing of the facility, which allowed the project team to quickly identify inconsistencies between the 2D and 3D designs.

Reviews during the 3D spatial environment also eliminated erection and commissioning errors. Additionally, digital design reviews and digital documents were used for all deliverables, which helped identify the use of natural resources to qualify as a green project. The team incorporated site and design changes using a methodical and collaborative approach.





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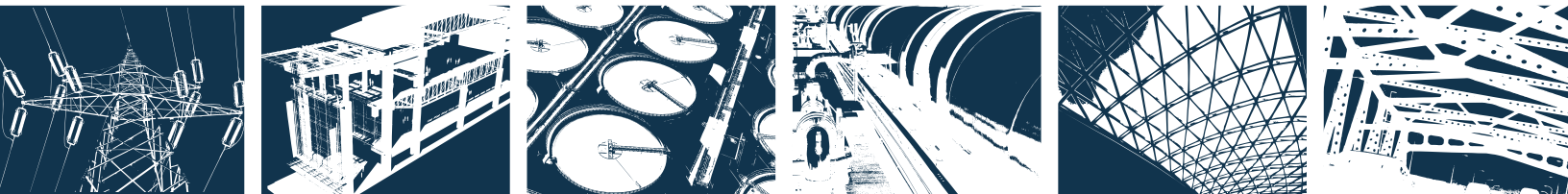


Recognizing the critical importance of being a good corporate citizen, Bentley is uncompromisingly committed to supporting ecological sustainability. This support goes beyond the stewardship of environmental resources to include investment in strategic educational and training initiatives that foster a workforce of skilled infrastructure professionals capable of meeting the world's growing sustainability challenges.

*The AutoPlant Project Showcase* is one small example of Bentley's commitment to promoting sustainable development through its business practices. As part of this effort, this publication has been printed on Forest Stewardship Council (FSC) certified paper, which identifies products that contain wood fiber from well-managed forests.



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