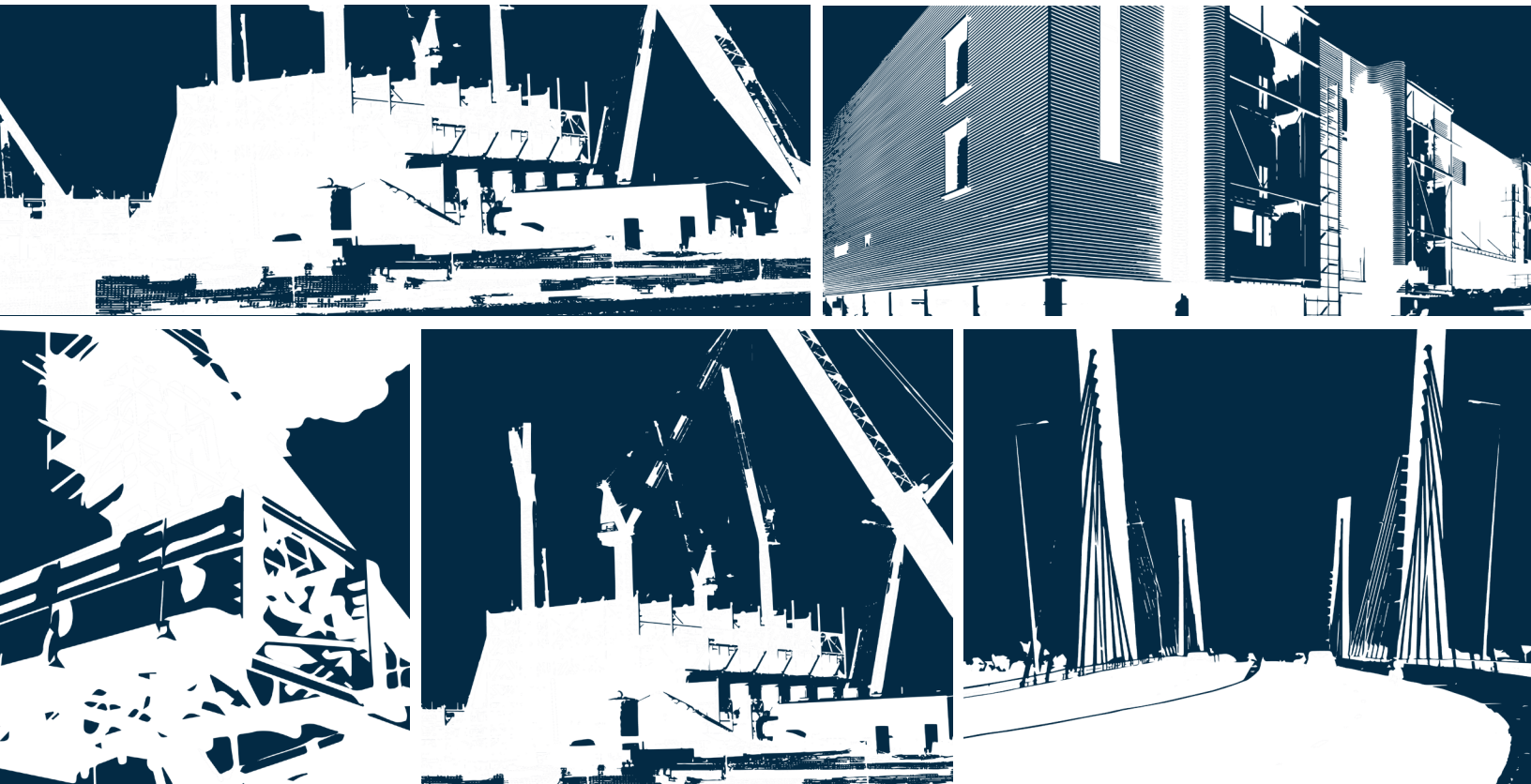
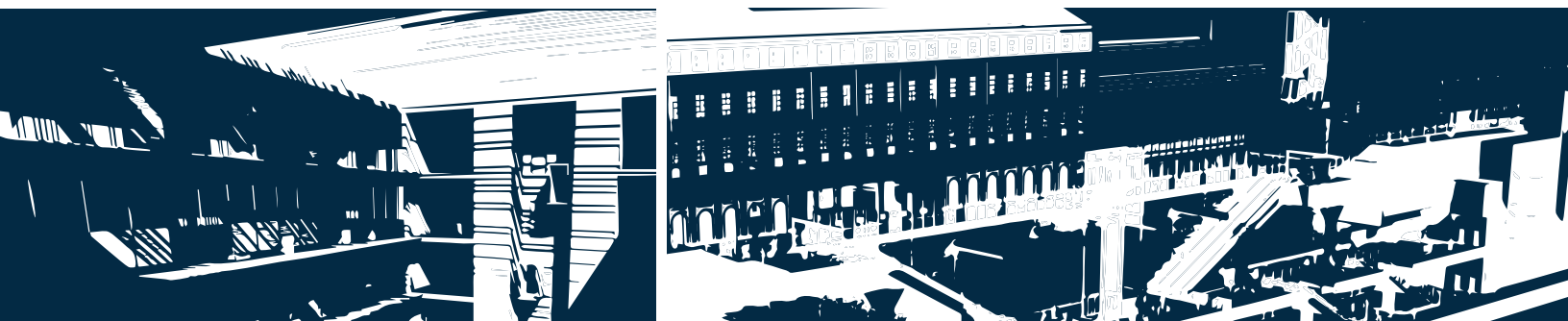


THE CONSTRUCTION PROJECT SHOWCASE



Extraordinary Infrastructure of the *Be Inspired* Awards



Bentley®
Sustaining Infrastructure



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 Construction 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.

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Digital versions of *Be Inspired* Awards publications are available online at 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, 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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CONSTRUCTION – IT'S HOW YOUR WORLD WORKS

Construction is arguably the greatest contributor to the health and growth of the global economy. Even other industries that may surpass construction as a contributor to a nation's gross domestic product (GDP) rely on construction for the infrastructure and commercial structures – from buildings and bridges to roads and refineries – that are necessary to create the products, services, and jobs critical to economic well-being. Essentially, construction is how your world works.

Since 1984, Bentley has helped firms throughout the construction lifecycle to reduce risk, improve productivity, and enhance safety. Now in our fourth decade in the industry, Bentley knows the dynamic nature and challenges inherent in construction and it's why we've developed and continue to expand our portfolio of construction software products and services that are designed to keep thousands of *moving parts working as one*.

Bentley's construction portfolio includes products for collaboration that accelerate teaming, mobile device productivity to unleash supervision, work process services that provide systematic real-time awareness, and information modeling for ensured constructability.

These offerings are more valuable today than ever before. Economic pressures require general contractors, EPCMs, and design/build firms to price projects with narrow margins that leave little room for error, while they also strive to respond to new standards and compliance requirements, skilled labor shortages, and other challenges.

Within these pages, you will find acclaimed projects that highlight how leading companies involved in the construction of infrastructure have used Bentley products to uniquely solve these challenges.

Each project has not only been nominated for a *Be Inspired Award* and acknowledged by a prestigious group of independent jurors as an award-winner or finalist for its innovation and achievement, but also serves as a testament to the abilities and creativity of the professionals who construct the world around us.

To learn more about Bentley's construction software, including videos of products in action, free trial downloads, and additional success stories from Bentley construction users, please visit www.bentley.com/Construction.

BRIDGES

Armando Rito Engenharia SA

April 4 Bridge

Catumbela, Angola

The April 4 Bridge connects the cities of Benguela and Lobito, Angola, replacing a one-lane steel bridge dating from the early 20th century. Now the Catumbela River crossing takes minutes instead of several hours. Located in the heart of Catumbela, the EUR 26 million, cable-stayed bridge symbolizes freedom and the end of war to the people of Angola.

Armando Rito Engenharia selected RM Bridge to conduct a tridimensional model analysis. The software helped define pylon geometry, design stay cables, and determine installation forces. The optimization module allowed for stress operations and time-dependent behavior. Innovations included a special saddle for the stays that reduced steel quantities and allowed for slimmer concrete masts.



BE INSPIRED AWARD FINALIST

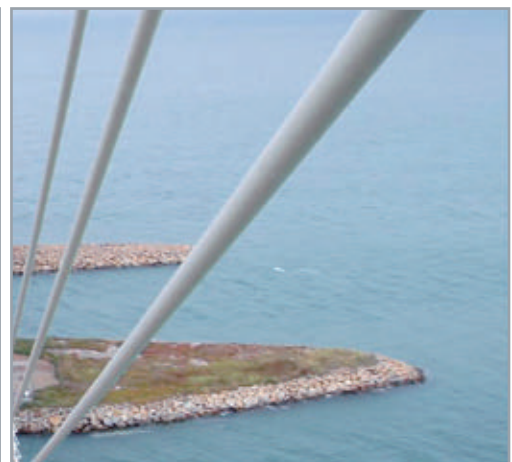
Atkins

Penang Bridge Stay Replacement

Penang, Malaysia

After a structural assessment of the 225-meter cable-stayed Penang Bridge in Malaysia detected a bar break on one cable and 117 overstressed main cables, Atkins Engineers used Bentley RM Bridge to carry out a global analysis of the structure. Keeping in mind the staged construction, the effects of creep and shrinkage, as well as the necessity of keeping traffic open on this highly vital route – the only link from Penang Island to the Malaysian mainland.

Bentley's RM Bridge allowed structural stress build up to be modeled more effectively, improving the turnaround of work approvals during construction. The space frame model enabled each cable replacement stage to be modeled using the staged construction system, resulting in saved time and cost for the project. Atkins' innovative maintenance strategy has since been passed on to continue effective cable maintenance in the future.



BE INSPIRED AWARD WINNER

Delich Roth & Goodwillie, P.A. Engineers Noland Road and I-70 Interchange Project Independence, Missouri, United States

The Noland Road and I-70 highway interchange is a key transportation hub for the city of Independence, Missouri, and the Kansas City metro area. The goal was to reconfigure the interchange with minimal impact on motorists and the surrounding community, shorten construction time, improve traffic flow and capacity, and address structural and safety concerns. Delich Roth & Goodwillie met the project objectives at a savings of USD 22.24 million for MoDOT.

MicroStation's collaboration technology was utilized heavily on the project. All teams involved were able to access the design data easily, and LEAP Bridge enabled engineers to design the superstructure, substructure, and bridge geometry within one software application. A comprehensive traffic management plan, coupled with the use of a new shallow precast, pre-stressed concrete box girder bridge superstructure, allowed the USD 11.13 million bridge to be constructed and open to traffic in only two months.



EIPSA Contreras Bridge Villargordo del Cabriel, Spain

The USD 200 million Contreras Bridge is a high-speed railway bridge over Contreras Reservoir in Villargordo del Cabriel, Spain. The 587-meter viaduct is divided into 12 intermediate spans of 43.5 meters and two end spans of 32.6 meters. The deck is supported by a 261-meter curved arch, making this the longest arch bridge in Spain and the longest railway concrete arch bridge in Europe. The Madrid-Valencia link will shorten journey time from 4 to 1:30 hours.

The arch was built by cantilever construction supported on temporary stays. EIPSA used RM Bridge to determine the correct forces of the stays and minimize the number of stressing operations. Not a single correction of the stressing forces was needed on site. RM Bridge also provided thorough checking of the arch during construction.



BRIDGES

GS Engineering & Construction

Baek-Suk Bridge Construction Project

Incheon, South Korea

GS Engineering & Construction (GS E&C) is a top-ranking Korean company in the fields of architecture, civil engineering, housing, environment, and power plants. Since its establishment in 1969, GS E&C has participated in numerous public and privately funded infrastructure projects to construct roads and bridges for the balanced development of the nation and economy.

The KRW 84 billion Baek-Suk Bridge in Incheon will be the official gateway to the main stadium for the 2014 Asian Games in Incheon. Constructed on a fast-track schedule in just 18 months, it is a concrete cable-stayed bridge with dramatically inclined pylons. GS E&C used RM Bridge for structural analysis to prevent interferences and minimize errors. Powerful geometry control and troubleshooting helped reduce the construction period by at least 6 months.



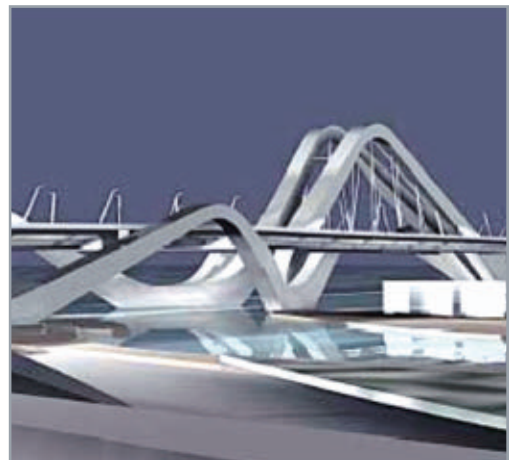
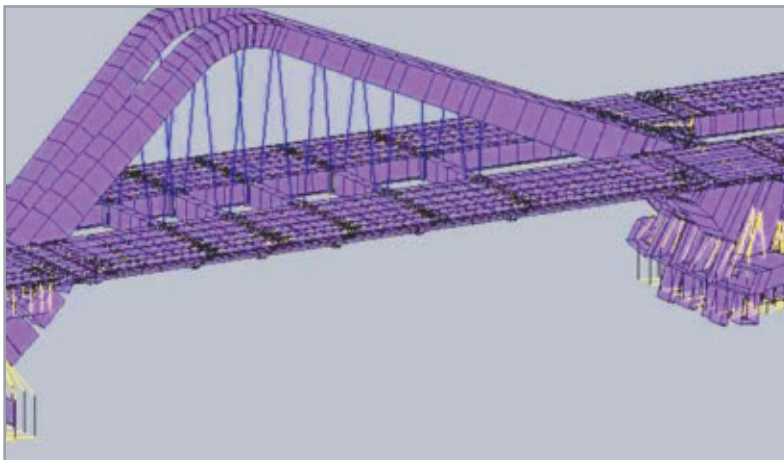
High-Point Rendel Ltd

Sheikh Zayed Bridge

Abu Dhabi, United Arab Emirates

The USD 230 million Sheikh Zayed Bridge will be an iconic gateway to Abu Dhabi Island in the United Arab Emirates. Award-winning architect Zaha Hadid conceptualized the structure to represent desert dunes, defined by continuous sweeping asymmetric arches that pass through the center of the bridge to then splay outside the deck and provide the entrance to the island.

The arches support two 24-meter-wide post-tensioned concrete decks, each carrying four-lane highways. Since the irregular shape of the structure posed engineering challenges, the extensive analysis required to investigate problems and find design solutions was performed using RM Bridge. A 4D step-by-step analysis of the construction sequence enabled swift resolution of any issues, resulting in cost savings during construction.



Louisiana Department of Transportation and Development

I-10 Twin Spans Bridges

Slidell and New Orleans, Louisiana, United States

The I-10 Twin Spans cross Lake Pontchartrain, Louisiana, to provide one of the main evacuation routes for New Orleans. The 5.5-mile spans carry three lanes in each direction. Goals for replacing the structures damaged by Hurricane Katrina included storm protection, traffic safety, and barge collision resistance. The project team deployed MicroStation, ProjectWise, InRoads, STAAD, LEAP CONSPAN, and LEAP RC-PIER.

Utilizing precast concrete elements, the project team was able to begin construction of this USD 750 million project within 14 days of the hurricane and put both spans into service within six years. Bentley software helped engineers to share files and review submittals, produce better designs, provide clarity to contractors, and avoid costly change orders and delays. The project was completed ahead of schedule and USD 53 million under budget.



BE INSPIRED AWARD FINALIST

STUP Consultants Pvt. Ltd.

Design and Construction of Combined Flyover at Bharatmata–Lalbaug Junctions

Mumbai, India

The USD 35 million Bharatmata-Lalbaug flyover on B R Ambedkar Road in Mumbai, India, will improve traffic congestion near the crowded Lalbaug Market area. The four-lane, 2.45-kilometer elevated road allows motorists to avoid seven vehicular and two pedestrian signals. Traffic volume on the flyover is expected to increase from 52,500 to 62,700 vehicles per day by 2021.

The flyover comprises a twin-cell box-girder superstructure, single-pier/pier cap substructure, and pile foundations. STUP Consultants used STAAD.Pro for longitudinal and transverse analysis of the box girder, which was constructed of precast, prestressed segmental concrete. One challenge was transporting the segments from the casting yard through heavy traffic congestion to the construction site 12 kilometers away.



BUILDING

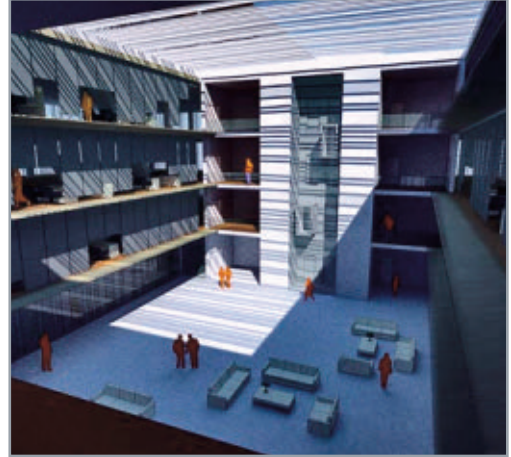
A. Burmester Arquitectos Asociados Lda

Electricity of Portugal

Lisbon, Portugal

The EUR 800,000 Electricity of Portugal project in Lisbon, Portugal, is being designed by A. Burmester Arquitectos Asociados. It is a sustainable project with LEED Gold certification. The project team is using MicroStation PowerDraft as a collaborative platform.

MicroStation PowerDraft is enabling multiple designers from three different organizations to work on files simultaneously. At the same time, the files are constantly updated.



Al Futtaim Carillion

MotorCity Uptown Area II Buildings

Dubai, United Arab Emirates

Dubai's uptown MotorCity is a master-planned neighborhood with amenities, schools, recreation areas, sports facilities, and retail outlets. Within the first month of construction in Area II, Al Futtaim Carillion implemented enterprise-level engineering content management to make information readily accessible to the in-house team and external contractors on three continents. ProjectWise proved to be 80 percent more efficient than a paper-based system.

More than 7,000 design drawings were imported into ProjectWise and in excess of 300,000 records were managed for this USD 490 million project. During deployment, the entire team used the collaboration tools to work efficiently across time zones. Training by Bentley and Al Futtaim Carillion's ProjectWise power users familiarized contractors with the system, which saved time in finding and distributing information.



COMSA

Multipurpose Hall of Gran Canaria

Las Palmas de Gran Canaria, Las Palmas, Spain

As contractor for the Multipurpose Hall of Gran Canaria in Las Palmas, Spain, COMSA anticipated a number of design changes and a short fulfillment time. The goal for constructing this EUR 54 million multipurpose hall was to manage information effectively and minimize fulfillment mistakes.

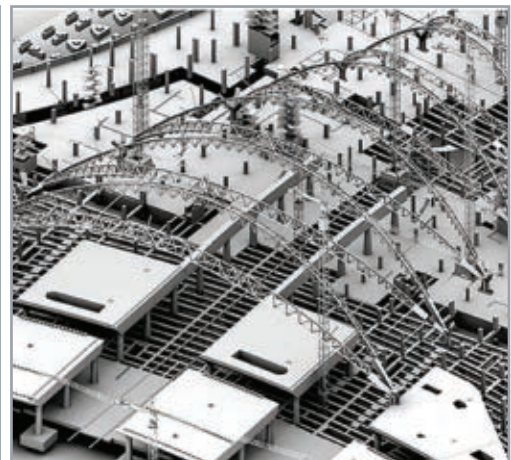
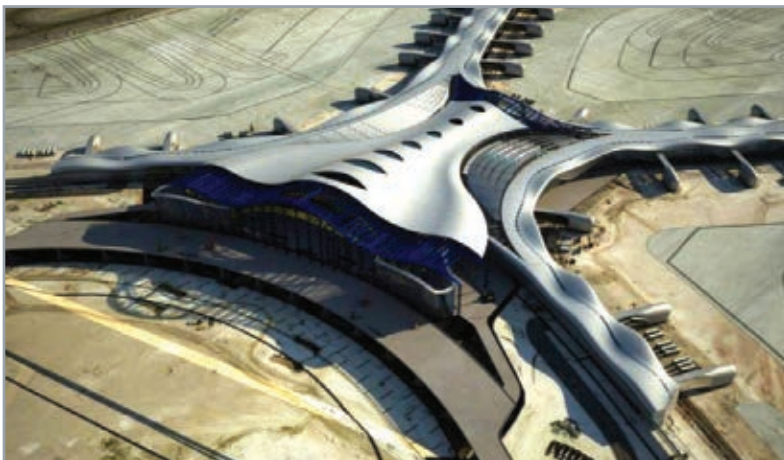
MicroStation was used to verify the geometry and create a complete 3D model of the structure. Displaying the original project plan and 3D model together allowed COMSA to detect mistakes. Proposed changes were incorporated in the model for review and issuance of updated plans. Using a constantly updated, live model during fulfillment sped up communications and aided decision making.



Consolidated Contractors Company on Behalf of TCAJV
Midfield Terminal Building – Abu Dhabi International Airport
 Abu Dhabi, United Arab Emirates

The USD 3.2 billion Midfield Terminal Building of the Abu Dhabi Airport is a 750,000-square-meter project that will provide passenger and cargo facilities, duty-free shops, and restaurants for up to 40 million people per year. The X-shaped structure is located between two runways, and the complexity of the structure in both design and shape presented challenges in terms of engineering, construction, and procurement, leading Abu Dhabi Airports Company to require a totally BIM-driven lifecycle to facilitate project delivery.

Consolidated Contractors Company leveraged its 17 years of experience with Bentley BIM solutions to integrate Bentley products – including AECOsim Building Designer, MicroStation VBA, ProjectWise, and InRoads – with in-house platforms and to allow the company to meet demanding, ambitious, and quite unique specifications.



BUILDING

DHV Buildings

Photovoltech Solar Factory

Tienen, Belgium

Increased demand for Tienen, Belgium-based Photovoltech's highly efficient and patented solar cells prompted the company to expand capacity with a new factory containing six high-end solar cell production lines. As prototype lines, flexibility for future enhancement was essential. Emphasis was placed on line one while lines two through six configurations would be determined in the future.

DHV Buildings used MicroStation, Bentley Architecture, and Bentley Building Mechanical Systems for the modeling and testing of various options as it sought new solutions for prefabricated construction elements. The integrated products better leveraged its working relationship with other contractors and proved invaluable in terms of reducing costs and saving time.



DHV BV

Las Palmas Penthouse

Rotterdam, Netherlands

One of a pier's buildings formerly housed the workshops of the Holland Amerika Lijn, and using the original structure of the building, architects designed the new Las Palmas to house museums, catering establishments, and a wide range of businesses while preserving the distinctive architecture that reflected its industrial roots.

The construction of the penthouse with its two floors of offices was so light that it could be built onto the existing concrete structure without any additional structural reinforcement. Architectural requirements made it necessary to revise the design repeatedly, which was simplified by using a 3D model created in MicroStation and TriForma. The model was also used to generate ground plans and sections for use with 2D drawings.

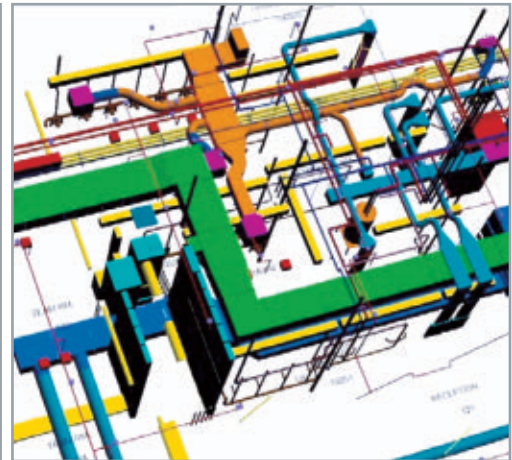
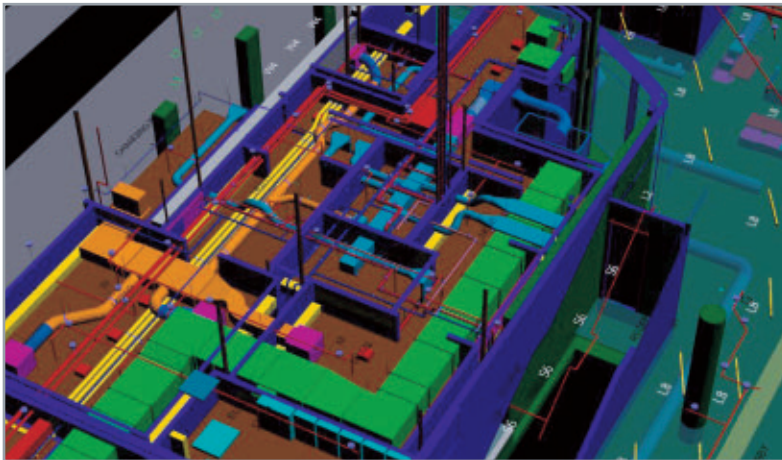


Arizona State University New Business School

Tempe, Arizona, United States

DPR Construction developed a lean modeling approach to delivering 3D visualizations on site during construction of Arizona State University's new USD 60 million business school in Tempe. The goal for this project was to generate real-time virtual mock-ups from federated models to pave the way for 3D rolling completion lists and punch list mark-up items.

The integrated platform of Bentley Navigator, AECOsim Building Designer, MicroStation, and ProjectWise generated and packaged sequential building information models (BIMs) for field validation. The process eliminated reproduction of drawings/spool sheets from the model, which reduced field BIM labor time by 12 to 14 percent. Based on initial metrics, the labor reduction translated into a 35 percent cost savings on BIM resources during construction.



DSD Ferrometalco SAE

New Doha International Airport Cargo Facility

Doha, Qatar

Qatar Civil Aviation Authority is adding capacity at the New Doha International Airport in preparation for the 2020 World Cup Tournament in Qatar. DSD Ferrometalco was tasked with fast-track delivery of steel for the EUR 80 million cargo terminal currently under construction. The company detailed, fabricated, and shipped 18,000 metric tons of steel by truck from Egypt to Qatar within 12 months, which was a company record.

The shipments included curved trusses, handrails, beams, and columns with complex configurations. Using ProSteel enabled DSD Ferrometalco to meet the tight schedule. Modeling revealed optimal designs for efficient construction and reduced waste in material and cost. Shop-welding trusses reduced bolted connections by 30 to 40 percent. A 25 percent reduction in bolts and splice plates shortened erection time.



BUILDING

Flad Architects

Biotechnology Company – Fill/Finish Facility

Northwest United States

Seismic risk prompted this biotechnology company to relocate production to northwestern United States. Design, construction, and turnover of the new 300,000-square-foot, five-building facility was accomplished in 24 months. The aggressive schedule required a design team of more than 250 professionals worldwide. Through broadcast web meetings and conference calls, the team members coordinated design using building information modeling (BIM).

The USD 400 million facility required an analysis tool that included seismic provisions, foundation design, connection design, and the ability to export into BIM software. RAM Structural System and RAM Connection enabled the engineering team to move with unprecedented speed and accuracy to stay ahead of the steel fabrication and construction schedule, meet the owner's aggressive schedule, and complete the project on time.



BE INSPIRED AWARD FINALIST

Geico S.p.A.

Automotive Paint Shop

Russia

Geico is a turnkey supplier of original coating plants for the vehicle industry around the world. The company recently completed an automotive paint shop for a 108,000-square-meter car factory in Russia. Efficiencies of its software enabled Geico to complete the design phase of the paint shop within six months.

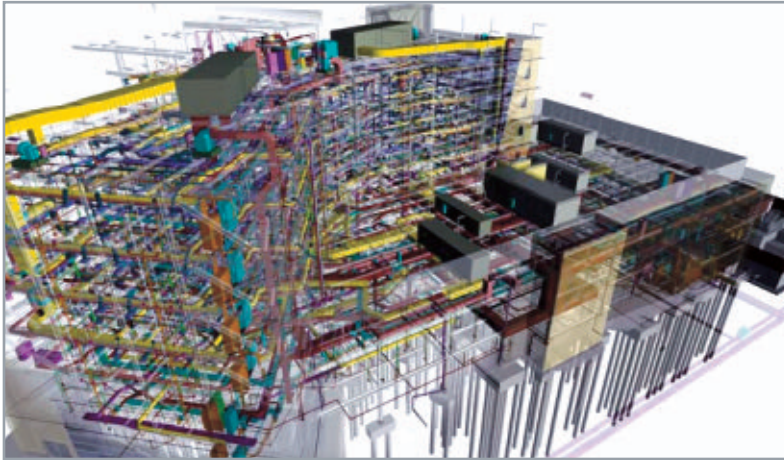
Using MicroStation and Bentley Building Mechanical Systems verified discrepancies in real time during every phase of the project, and the team reduced the time required for modeling by 20 to 25 percent. Compared to previous projects, the number of discrepancies was reduced by up to 30 percent. The reduced modeling time saved an estimated 20 percent in costs compared to previous projects.



GHAFARI Associates, LLC
Sutter Health Eden Medical Center
 Castro Valley, California, United States

Sutter Health's Eden Medical Center is a USD 400 million campus in Castro Valley, California, with a 130-bed acute-care hospital and an attached four-story clinic and radiology center. An integrated project delivery team is responsible for the interior tenant build-out. GHAFARI Associates customized a ProjectWise deployment to support the project's document-sharing needs and improve overall team collaboration.

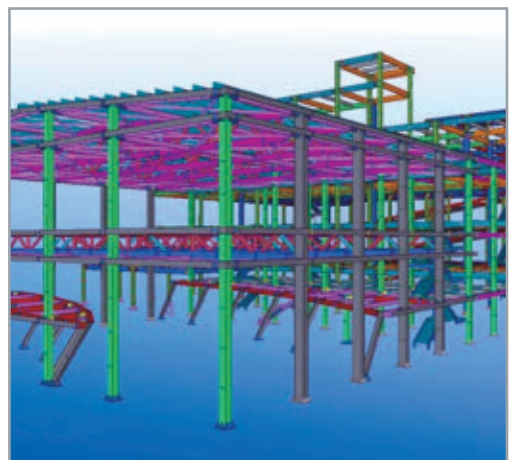
The firm hosted the integration server at its headquarters and strategically deployed file storage and caching servers near teams doing the work. All 3D models, 2D CAD files, specifications, and other project documents were stored on the system. The use of ProjectWise saved the equivalent of a full-time document manager for four years, equating to approximately USD 1 million in cost savings. MicroStation and Bentley Navigator were also used in the project.



Guangzhou Panyu District Shiqiao Architectural Design Institute Co., Ltd
Audi 4s Construction
 Guangzhou, China

The iconic Audi brand shop in Guangzhou, China, is a 13,000-square-meter facility with a three-story exhibition hall and four-story workshop. The exhibition hall is a large truss structure with a 32 meter span. As chief technical engineers, Guangzhou Panyu District Shiqiao Architectural Design Institute was responsible for the entire project from design concepts through construction completion and operation.

STAAD for China was used for steel structural analysis and design, achieving a seamless connection between design and construction by leveraging 3D modeling. The STAAD solution facilitated clear cost accounting, reduced computational time, and shortened the construction period to just 90 days.



BUILDING

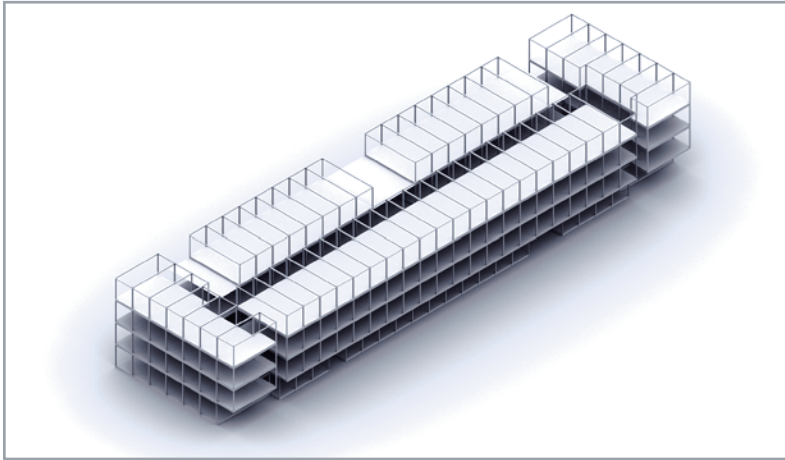
IBUG 21, S.L.

NIBUG

Barcelona, Spain

Based in Barcelona, Spain, IBUG 21 introduced NIBUG as a system to industrialize any building. It is designed for use in international building markets where off-site construction facilities are not readily available. The innovative technology was developed as a custom application within Bentley Architecture, which provided easy access to native functions and interoperability with other software.

IBUG 21's custom application consists of a series of instructions, macros, and VBA scripts presented in a custom interface that guides the process of industrializing buildings. NIBUG can be applied to a variety of buildings, from residential housing to hotels and hospitals. The only requirement is the availability of open, free space.



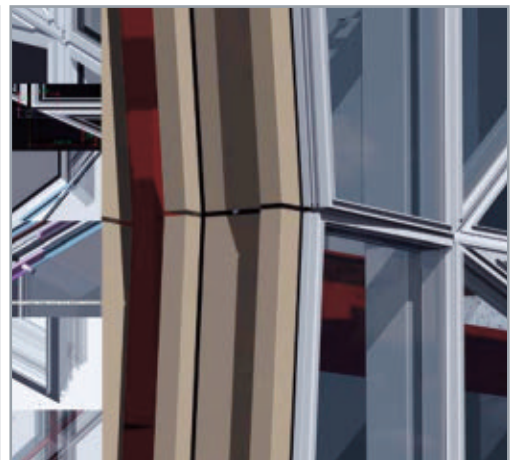
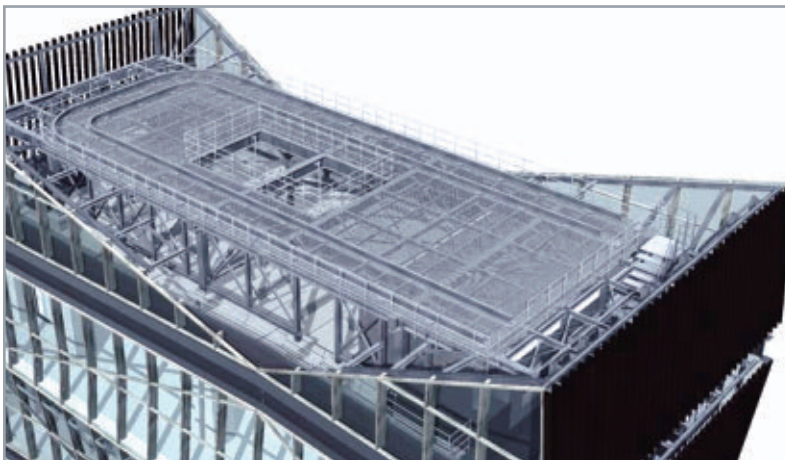
Maeda Corp.

v-Project

Tokyo, Japan

Maeda Corp.'s project, a business complex built in the center of Tokyo, is a 10-story building with a glass showroom that provides a feeling of transparency. The project was implemented on a single platform from design to construction using Bentley Building Information Modeling.

The project integrated the 3D design model into the construction stage. The construction model was also used for modification by the design department, a variety of visualized proposals to the clients, and for detailed coordination with the subcontractors. As a result, construction was completed within 15 months and the time required for analysis and changes was reduced by 50 percent. In today's environment of reduced construction time, this means a 50 percent increase in review time and higher quality.



Matec Engenharia

Planning Innovation of a Medical Center

Sao Paulo, Brazil

Matec Engenharia was chosen to develop a USD 15 million built-to-suit medical center in Sao Paulo, Brazil. Matec is an investor and the engineering-construction company for the 8,500-square-meter building designed to meet LEED Gold certification standards. The design phase took longer than expected, leaving just six months for construction. Installation and commissioning of sensitive equipment in a shielded room complicated construction staging.

Bentley's building information modeling software was used to streamline workflows in multiple disciplines, allow critical analysis and error detection, and optimize costs and scheduling. Simulating alternative assembly sequences and logistics, then applying the results to engineering resource planning enabled Matec to visualize the best solution and saved three weeks (9.5 percent) in overall construction time.

*BE INSPIRED AWARD FINALIST*

Matec Engenharia

BIM: Advanced Brazilian Civil Construction

Sao Paulo, Brazil

Matec Engenharia, based in Sao Paulo, Brazil, was focused on increasing productivity and work-quality company-wide. It determined that improving critical analysis, error detection, cost optimization, and coordination of resources using building information modeling (BIM) would be the best fit for their complex projects with short deadlines. The transition to BIM required a change in mindset for the project team members and internal designers.

By working with Bentley to integrate a suite of software with other systems and nomenclature, Matec was able to establish a simultaneous engineering process between internal engineering areas and external designers. Since beginning this new approach Matec has noticed a savings of 40 percent in time, 30 percent on materials, and thousands of dollars.

*BE INSPIRED AWARD WINNER*

BUILDING

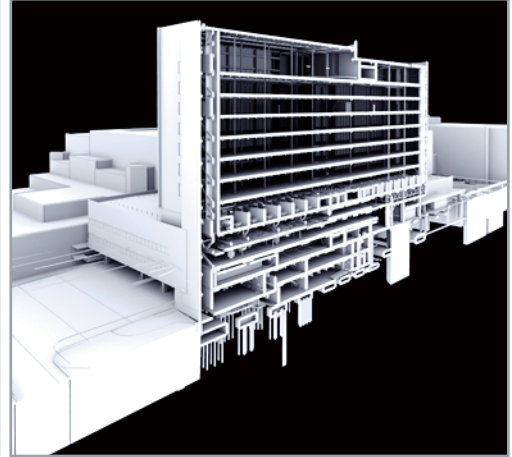
NBBJ

Miami Valley Hospital

Dayton, Ohio, United States

The Miami Valley Hospital project is a USD 137 million campus renewal effort, which includes the 12-story, 480,000-square-foot Heart Tower, designed for maximum efficiency by NBBJ using Bentley software. Bentley Architecture provided a comprehensive and flexible BIM platform that allowed shareholders to collaborate on documents, presentations, studies and robust building information models demanded by the project. The flexibility of Bentley Architecture allowed for cross software modeling collaboration between teams.

The BIM-enabled integrated design process inspired the architects to model prefabricated in-patient rooms, with complex medical systems, as well as modular above-ceiling MEP racks, unitized curtain walls, and demountable caregiver stations. Constant communication and a platform that allowed access to models from every discipline were critical to the project's collaboration and success.



BE INSPIRED AWARD WINNER

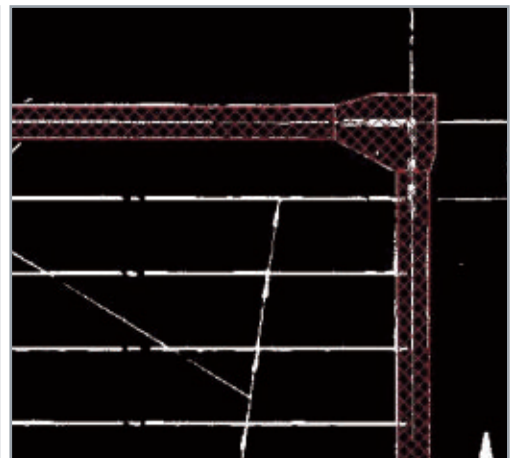
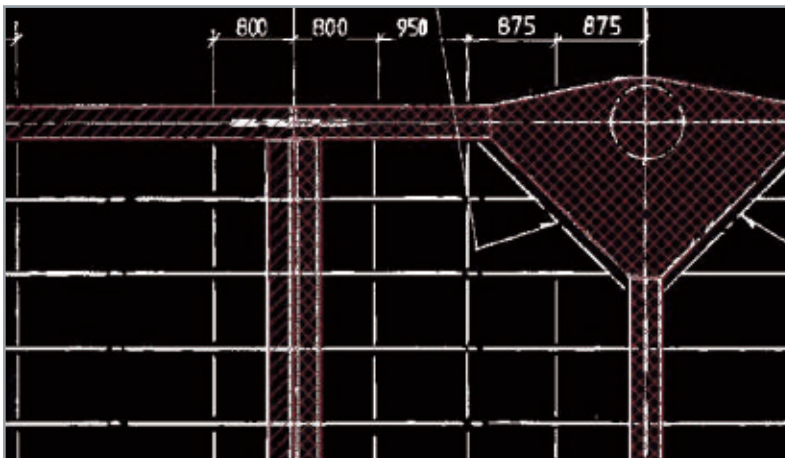
Ramboll Engineering Consultancy Services India Pvt. Ltd.

Passive Fire Protection Upgrade

Chennai, India

For this USD 500,000 project in Chennai, India, Ramboll prepared passive fire protection (PFP) upgrade drawings based on existing structural drawings, incorporating PFP upgrade as-built details, legends, and markups. After scanning hard copies for digital images, the project team created digital base drawings and upgrade as-builts that can be used more effectively in the future.

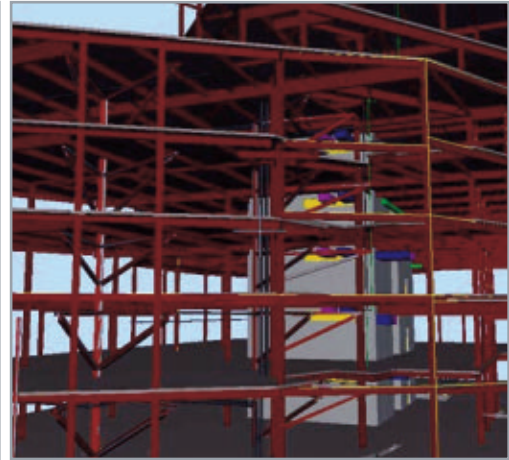
To achieve the high productivity required for this project, the team customized MicroStation to meet the standards mandated by the client. Designers used MDL and macros to custom build the standards for symbology, templates, and patterns. Numerous patterns were created to represent the different PFP coatings. The PFP as-builts can now be updated in the field.



Shawmut Design and Construction
Dudley Square Municipal Building
 Boston, Massachusetts, United States

Located in Boston's Roxbury neighborhood, the USD 86 million Dudley Square Municipal Building will occupy the site of the historic Ferdinand Building in Massachusetts. The urban location posed significant challenges, including preservation of three historic facades, coordination among two architectural design teams and dozens of subcontractors, and six construction-document release packages.

Shawmut Design and Construction's design methodology allowed the construction management team to collaborate closely with the design team on resolving constructability issues in real time. This reduced rework and kept the project on the shortest path to delivery. The firm used ProjectWise to collaborate, ProjectWise clash resolution to review components within the model, and Bentley Navigator to review models.

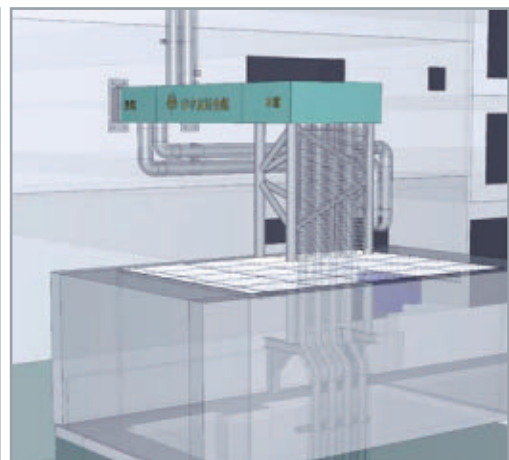
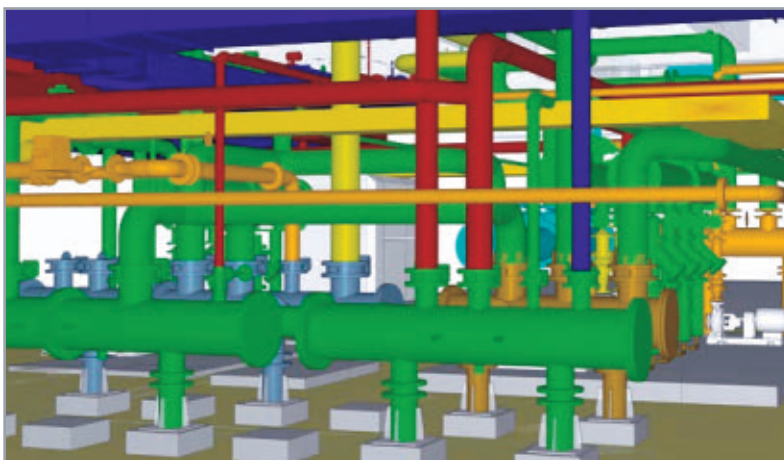


BE INSPIRED AWARD FINALIST

Shinryo Corporation
Japan-China Friendship Center HVAC Renewal
 Tokyo, Japan

The Japan-China Friendship Center in Tokyo, Japan, is a 37,792-square-meter facility with 12 stories above ground, four stories below ground, and an annex for offices, hotel, museum, school, and dormitories. Building equipment repairs are done during interim periods in spring and fall when cooling and heating systems are not operating. For this JPY 1 billion project, Shinryo had a 20-day window to replace HVAC equipment and restart operations.

Given just two months to prepare after the March 2011 earthquake, Shinryo surveyed and measured the building, created a 3D building information model, prepared work plans, and added a time axis to achieve integrated project delivery. Using MicroStation to centralize the information reduced the effort to build the work plan from eight people over 60 days to five people over 50 days.



BUILDING

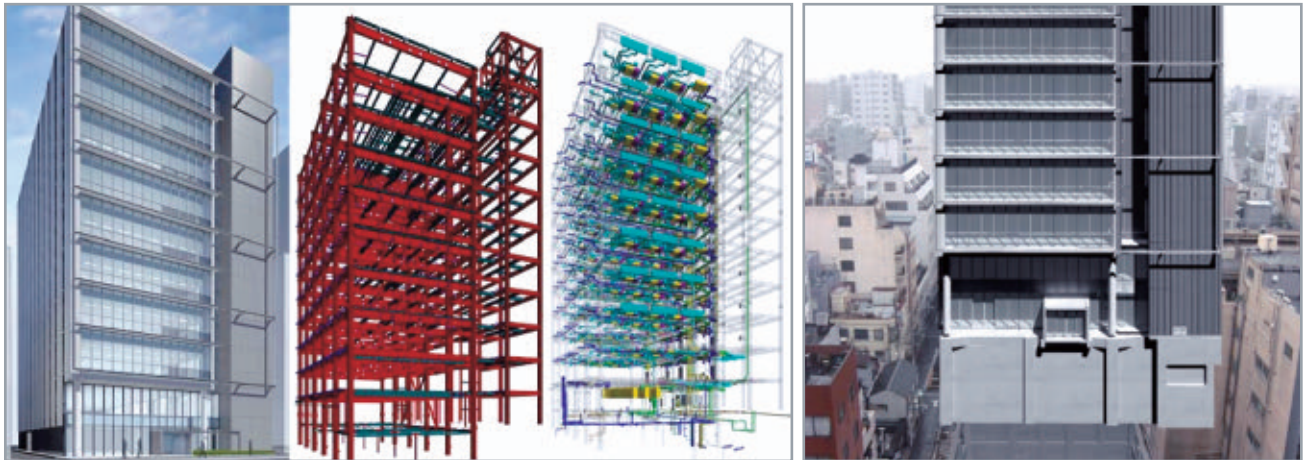
Takenaka Corporation

Virtual 3D Building Construction

Tokyo, Japan

Takenaka Corporation constructed a 7,000-square-meter office building with one basement level and 10 floors above ground using the underground structural frame of an existing building in Tokyo, Japan. Using building information modeling (BIM) for design and construction simulation, the project team completed virtual construction of the building prior to commencing actual construction.

Takenaka used Bentley BIM solutions to adjust and confirm alignment of the existing underground structural frame with the structural frame of the new building. BIM tools reduced design hours by 10 percent, improved construction efficiency, and reduced the number of construction workers by 15 percent. Construction time was reduced from the typical 14.5 months to 13 months.



Takenaka Corporation

W Project

Tokyo, Japan

Constructing a USD 23.8 million, eight-story building in Tokyo, Japan, required meticulous attention to seismic design strategies in order to ensure the health, safety, and security of building occupants and assets. An additional challenge on this project was to deliver the building on a limited budget and in only 11 months. Takenaka's approach included using Bentley Architecture for 3D modeling.

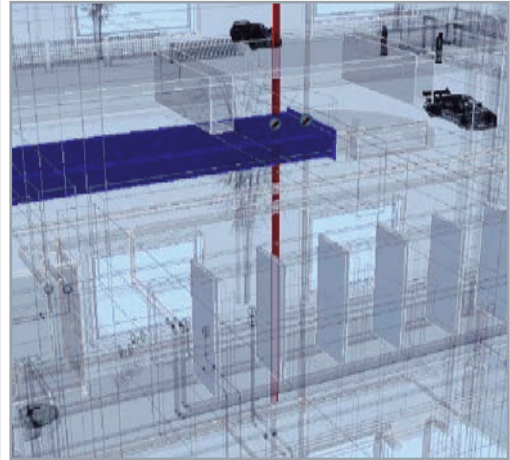
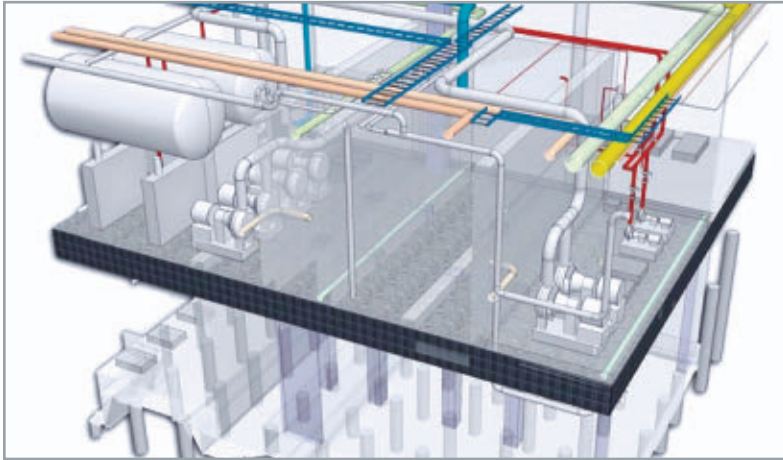
Bentley Architecture's 3D model was used to check every design detail before construction. Bentley Interference Manager was used to identify and resolve interferences in more than 300 locations, helping to avoid rework onsite. The software contributed to reducing the construction manpower needed by 20 percent and shortening the construction time from 12 to 11 months.



Tianjin FAW Toyota Motor Co., Ltd.
New Toyota Factory
Tianjin, China

FAW Toyota's 25,000-square-meter supply factory under construction in Tianjin, China, will produce USD 320 million in parts for 10 automobile models. Preliminary 2D design of the USD 174 million project caused problems with material estimates, interferences, on-site changes, and construction delays. To overcome these difficulties, Tianjin FAW Toyota Motor Co. created a 3D digital factory model that improved work efficiency by 80 percent.

Using MicroStation, Bentley Navigator, Bentley Architecture, Structural Modeler, and Bentley PlantSpace, FAW Toyota accurately quantified materials and estimated construction costs. Interferences were eliminated during the design phase, reducing on-site changes valued at USD 240,000. Construction progress simulation, sequencing, and work package optimization maximized the use of construction space and shortened the construction period by eight weeks.



MINING AND METALS

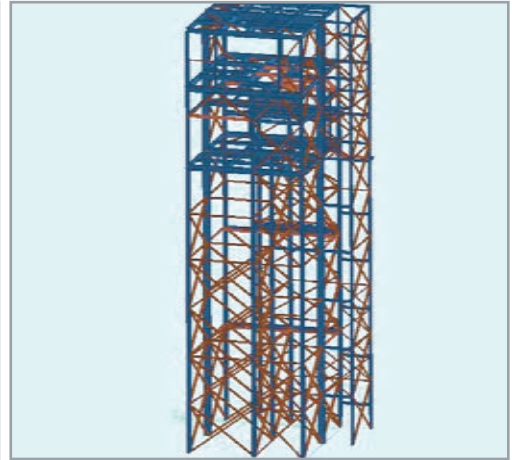
BSBK Engineers Pvt. Ltd.

Coal-Handling Plant

Jaigad, India

BSBK Engineers undertook a USD 10 million design and construction of an Internal Coal Handling Plant for the thermal power plant in Jaigad, India. All the structures were to be designed for 19 fundamental load scenarios—dead load, live load, equipment involving dynamic loads, wind loads, seismic loads—and conveyor running conditions.

Using STAAD.Pro, BSBK completed the structural design and obtained project consultant approval in 2.5 months. The STAAD.Pro model comprised 574 nodes, 1,298 members, and 13 supports. Without STAAD.Pro, analysis would have been extremely difficult and time consuming. The software also allowed the company to economize during construction.



CISDI Engineering Co., Ltd.

Panxi Iron and Steel Project

Xichang, China

The Panggang Xichang Vanadium and Titanium Resources Integrated Utilization Iron & Steel Project was contracted and designed by CISDI Engineering Co. Located in China's Sichuan Province, the USD 3 billion project encompassed four areas: iron making, steel making, steel rolling, and external pipelines. More than 200 CISDI designers carried out the multidiscipline project.

Using ProjectWise, MicroStation, Structural Modeler, Bentley Architecture, PlantSpace, and Bentley Navigator, CISDI leveraged 3D collaborative design. CISDI accurately transmitted data between disciplines, optimized design quality and cost, significantly reduced on-site collisions, and accelerated construction. Savings included USD 500,000 by reducing collisions and shortening construction time on the steel-making subproject.



MINING AND METALS

Hatch Africa (Pty) Ltd

New Tripper 2A at Saldanha Iron Ore Ship Loading Facility

Saldanha, South Africa

As the only export point for iron ore in South Africa, Saldanha Bay could not risk losing precious time to construction; when Hatch was contracted in the construction of a new tripper at the ship loading facility they faced numerous problems. The new tripper had to be built on the western point of the pier, due to space constraints, and all components of the project transported beneath the existing ship loader. Compounding this difficult feat was a structural failure in tripper 2A during the planned decommissioning of tripper 1A.

A swift rebuild of 2A with minimal impact on ore production was the project's main objective. Using the import and animation capabilities of Bentley MicroStation, Hatch combined the engineering and design phases by animating the construction sequence and carefully planning the construction of equipment. This enabled them to complete the project, from engineering to commissioning, within 10 months.



BE INSPIRED AWARD FINALIST

Hatch Africa (Pty) Ltd

QMM Ilmenite Project

Fort Dauphin, Madagascar

Before Hatch Africa could begin construction on the USD 900 million industrial facility in Fort Dauphin, Madagascar, it had to design and build extensive ancillary services and infrastructure. Focused on developing a productive ilmenite mine, Hatch needed to overcome vast logistical barriers while protecting precious flora and fauna in order to develop extensive infrastructure for the mine, including: a port, a power station, roads, the water supply, and communication networks.

For this project, effective and efficient workflows were key; using Bentley MicroStation as the core CAD platform, along with a suite of Bentley software, Hatch was able to overcome mounting obstacles and improve workflows, all while reducing costs. Using Bentley Structural, TriForma, PlantSpace, and Bentley Navigator, Hatch was able to create intelligent multi-discipline 3D models that increased efficiency, collaboration, and helped achieve a world-class safety performance.



BE INSPIRED AWARD WINNER

MINING AND METALS

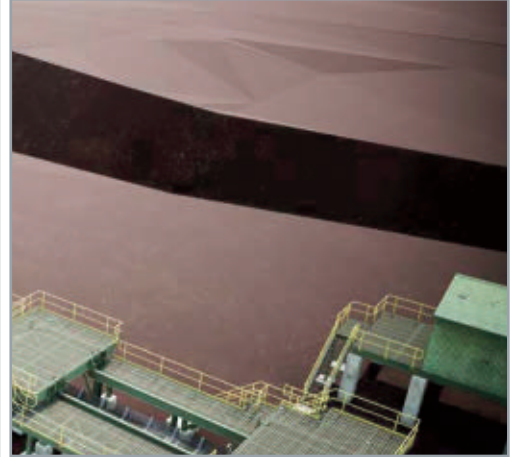
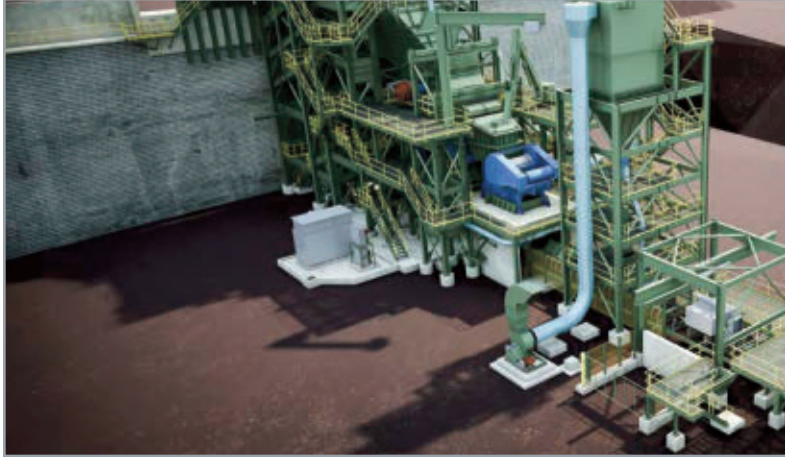
PDC Consultants

Brockman Syncline No. 4 Project

Pilbara, Australia

For the USD 1.5 billion mining facility in Pilbara, Western Australia, PDC Consultants provided 3D modeling and shop detailing for over 4,000 tons of mechanical and structural steel and associated platework. A major goal was to deliver a mine information modeling system with fully intelligent 3D review models including vendor items, 2D shop detailing drawings, electronic fabrication data, and detailed material takeoffs.

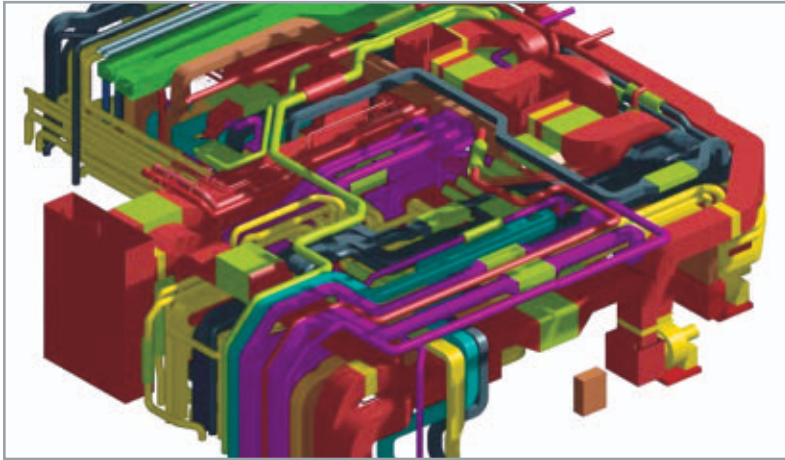
ProSteel provided PDC with an efficient and powerful solution that enabled collaboration across detailed engineering phases, cutting 10 to 20 percent off the estimated modeling and detailing man-hours. This ensured the project was completed earlier than expected within the aggressive schedule. Construction sequencing and planning tools assisted in delivering an accelerated construction program.



BE INSPIRED AWARD WINNER

The goal of this USD 50,000 project was to optimize an air conditioning system on a cruise ship. The challenge was to fit the large amount of pipe and ductwork within the constrained space while satisfying engineering requirements, maintaining safety standards, and assuring accessibility.

The use of Bentley products such as PlantSpace enabled NAVTEC to efficiently and effectively coordinate the project in Ancona, Italy. The software saved time and reduced waste materials.



PT McDermott Indonesia Cuu Long Su Tu Vang Project Mekong Basin, Vietnam

The Su Tu Vang Central Processing Platform off the coast of Vietnam is a fully integrated engineering, procurement, construction, and installation project that included a 4,400-ton, eight-leg jacket; 17,000-ton floatover topsides; 66-person, 1,323-ton living quarters; pipelines; umbilicals; and manifolds. The challenge was completing the project within 10 percent of the authorized budget while maintaining the highest safety record. ConstructSim facilitated the fast-tracking that allowed concurrent overlapping design and construction.

Just six months from contract award, primary steel drawings were released for construction. Taking advantage of steel delivery earlier than anticipated, the fabrication schedule was moved forward by one month. Interfaced with the 3D design model, ConstructSim was used in reporting, monitoring, and control of construction activity. Involvement of fabrication and operations personnel in constructability reviews resulted in an effective, construction- and maintenance-friendly platform design.



OFFSHORE ENGINEERING

Robert Elks & Associates

Rock Bolting Rig

Onslow, Australia

The USD 37 billion Gorgon project is developing the Gorgon and Jansz gas fields off the northwest coast of Western Australia. Part of this project is the 59.4-kilometer-long subsea DomGas pipeline. Robert Elks & Associates was retained to perform structural and mechanical engineering design and fabrication detailing for the rock bolting rig, which will install 1,546 pairs of stabilization anchors on the seabed along the pipeline.

The firm completed the project within 12 weeks. SACS calculated the environmental load for hundreds of combinations and checked members against standards. STAAD.Pro developed analysis models of welded assemblies, and data exchange with the latest ProStructures model integrated the workflows. The 3D environment allowed collaboration, visualization, and clash detection for a fully coordinated design.



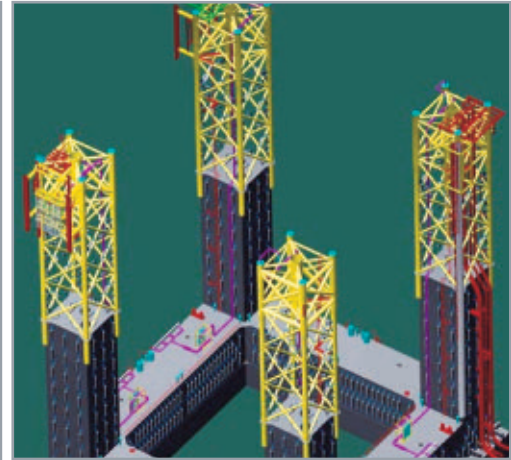
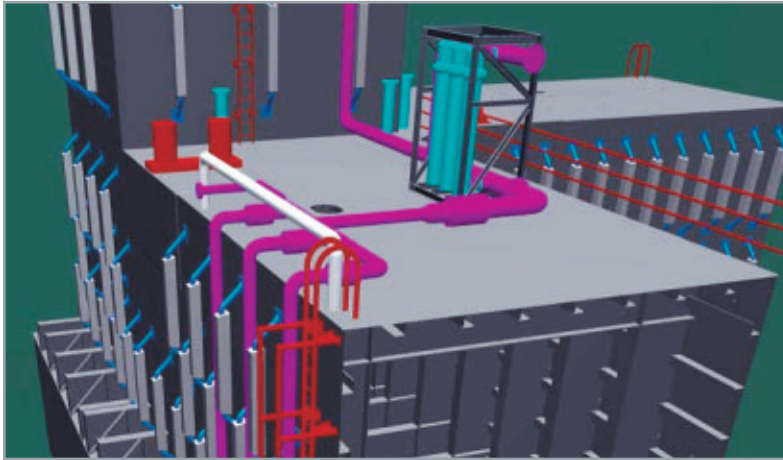
BE INSPIRED AWARD FINALIST

Turkmenistan Block 1 Gas Development Project

Kiyany, Turkmenistan

Petronas Carigali awarded a joint-venture EPC contract to MMHE/technip to develop the Block 1 oil field, which includes an MCR-A platform at the center of the oil field. The team chose Arup to design the steel gravity base structure. The main challenges were the foundation, seismic conditions, construction, and transportation. Bentley Structural 3D modeling proved invaluable in identifying and rectifying any possible construction restraints early in the project.

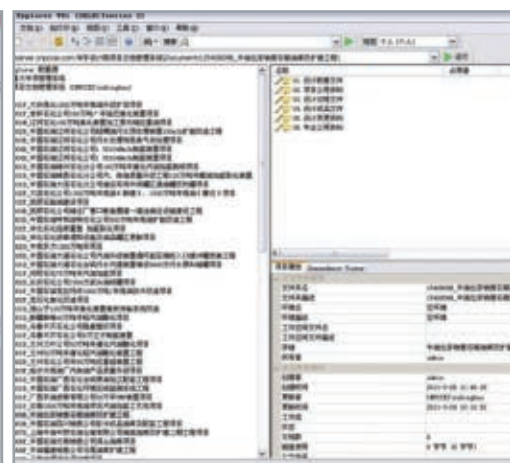
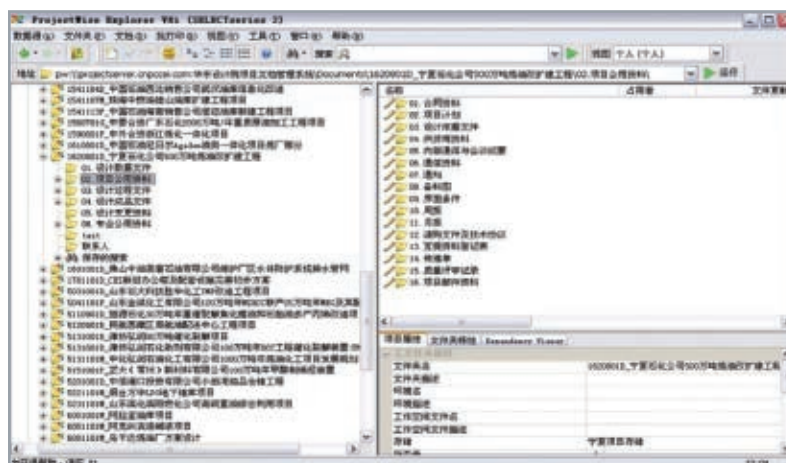
Understanding the sea-bed conditions required extensive underwater site surveys by performing additional bore-hole drilling around the platform perimeter. Arup examined seismic conditions by estimating the seismic activity range in the area through seismic activity records. Construction restraints required modular construction of the platform to transport it from Malaysia to the site.

**China Petroleum Engineering & Construction Corp. East-China Design Institute****CNPCCEI Collaborative Management**

Qingdao, China

China Petroleum Engineering & Construction Corp. East-China Design Institute (CNPCEI) manages engineering, procurement, and construction projects such as large-scale oil refineries. In the past, project files were dispersed among designers, making it hard to obtain accurate information in a timely and effective way. Manual document control procedures were time consuming, with no centralized access and ineffective version control.

CNPCEI implemented ProjectWise in 2009 and has since managed 67 engineering, procurement, and construction projects with more than 230,000 files. File management, version control, and usage problems were resolved. Document control was simplified and collaboration among branch offices flourished. ProjectWise resulted in time savings of at least 20 percent. The reduced man-hours lowered project costs by about 5 percent.



OIL AND GAS

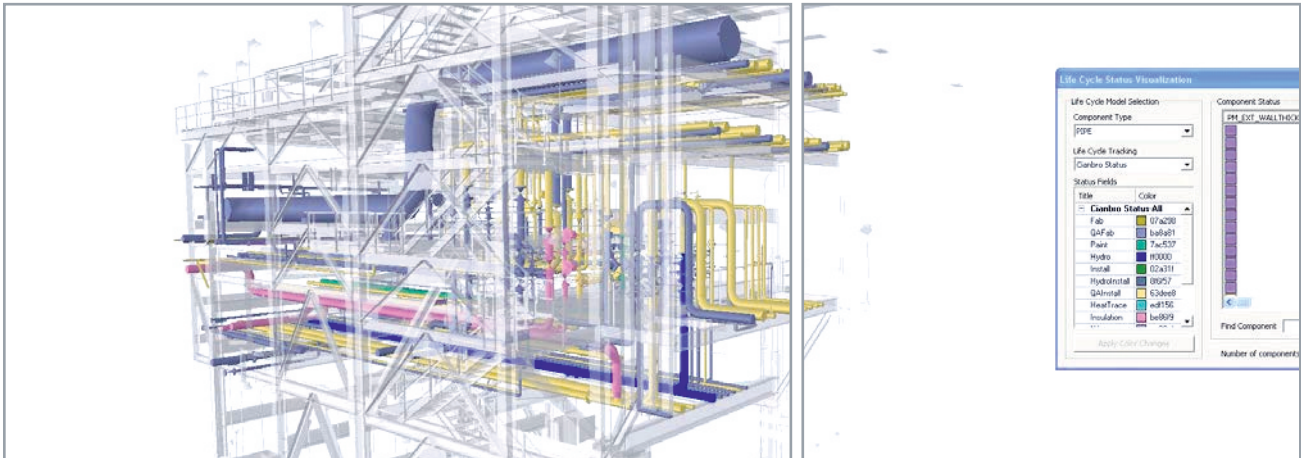
Cianbro Constructors

Motiva Crude Expansion Project

Brewer, Maine, United States

In 2004, when the 100-year-old paper mill, in Brewer, Maine, closed its doors for the last time the loss of hundreds of jobs produced by the mill devastated the town. In a USD 110 million revitalization effort, Cianbro Constructors in conjunction with South Brewer Redevelopment LLC, worked on behalf of Motiva Refinery, out of Port Arthur, Texas, to fabricate and construct 54 modules as part of a 325,000 barrel-a-day crude expansion project. Using Bentley ConstructSim's rich 3D visualization capabilities, Cianbro was able to teach employees, most of whom were working

on this type of fabrication for the first time, how to build these complex modules on the spot, down to each piece of piping. ConstructSim enabled Cianbro to plan, sequence, execute, and monitor their complex construction model more efficiently and to visually communicate the massive scope of their project to important stakeholders. Overall, the 15-month project led to the creation of hundreds of jobs and increased local business revenue, which had dropped when the paper mill closed.



BE INSPIRED AWARD WINNER

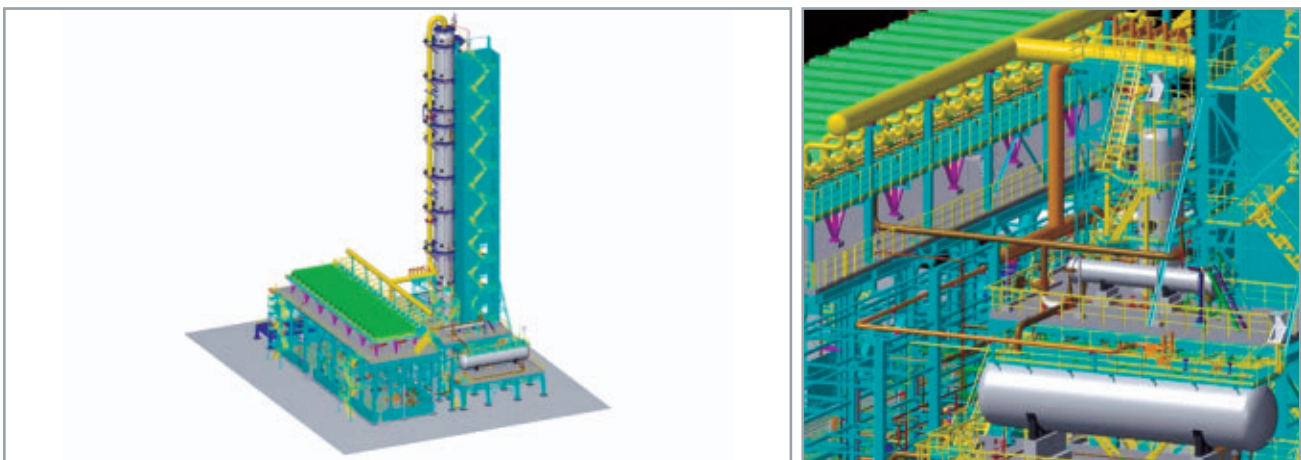
GUP Bachgiproneftechim

Deisohexanization Block

Ufa, Russia

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



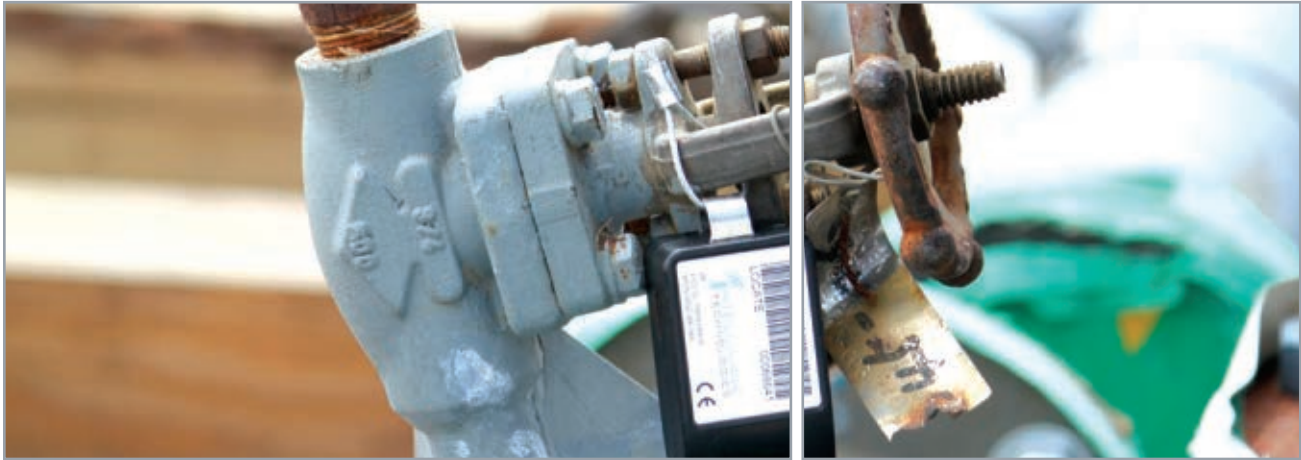
Intelliwave Technologies Inc.

Alberta Oil Sands

Alberta, Canada

Charged with expanding a major oil sands operation in northern Alberta, Canada, JV Driver was challenged to store and stage materials offsite and overcome an acute shortage of skilled construction labor. The company turned to Bentley and Intelliwave for an innovative solution that leveraged technology to track and update material status and location with fewer crew than usual.

Bentley's ConstructSim loaded engineering data including the 3D model, piping isometrics, and structural steel data to allow creation of field installation work packages (FIWP) from a virtual construction model. Intelliwave's SiteSense used radio frequency identification to track material fabrication, location, and availability status on site. Together, the integrated solution reduced FIWP planning time by 90 percent and resulted in field productivity improvements estimated to be in the range of 10-15 percent.



BE INSPIRED AWARD WINNER

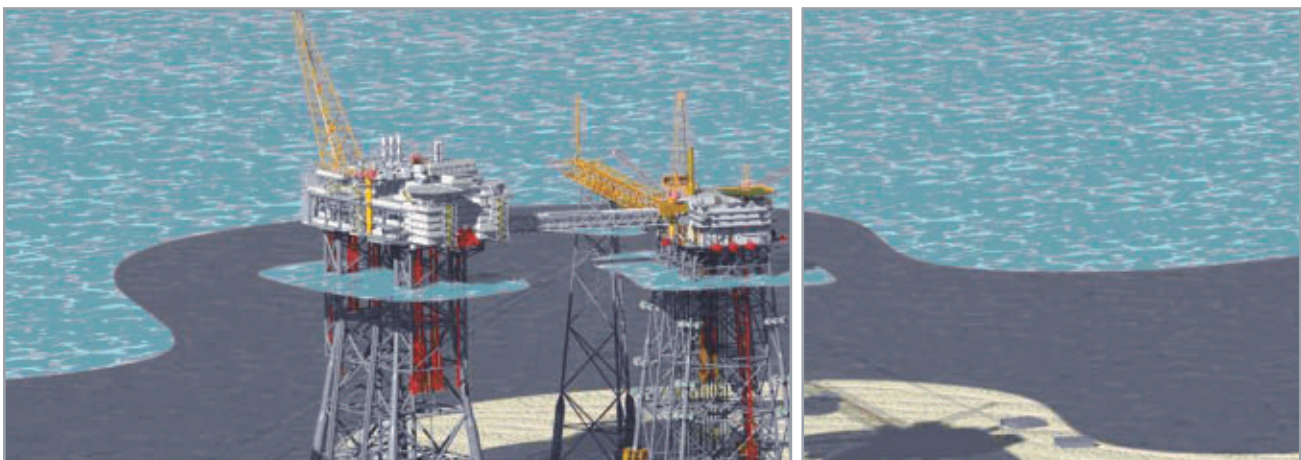
KBR/EOS Oil & Gas Services Joint Venture

The North Rankin Redevelopment Project

Danang City, Vietnam

The AUD 5 billion North Rankin Redevelopment Project is an ongoing effort that includes the installation of a second platform – North Rankin B (NRB) – located 135 kilometers off the shore of Karratha, Australia. The construction of NRB includes gas compression facilities, low pressure separators, utilities, and accommodations — all to be connected by the 100-meter bridge to the existing NRA platform, now operating as a North Rankin Hub.

This project, with a team of 530 people across four global work centers, aids in recovering low pressure gas from the North Rankin and Perseus gas fields. With such a widespread and large group of personnel the EOS Joint Venture called for a single integrated information management strategy and platform. Implemented during the front-end engineering and design (FEED) stage, Bentley eB Data Quality Manager (formerly ProjectWise Lifecycle Server) data warehouse became the central asset register for the entire NRB facility.



BE INSPIRED AWARD WINNER

OIL AND GAS

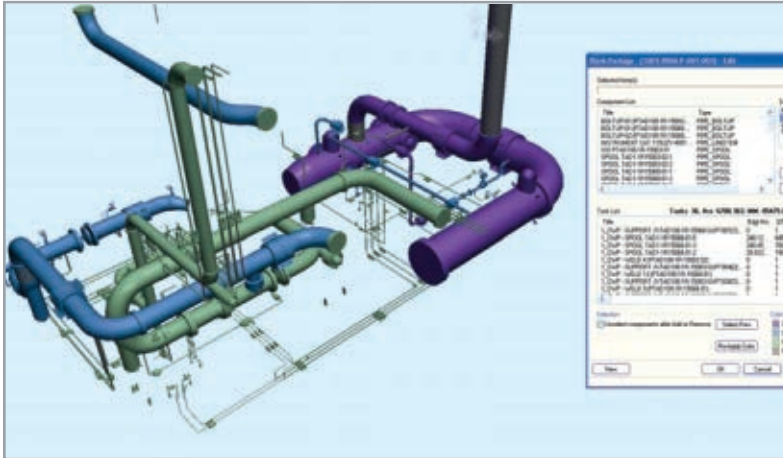
Kellogg Joint Venture Gorgon

Gorgon Project

Barrow Island, Australia

The AUD 52 billion development of the Greater Gorgon gas fields on Barrow Island, a protected nature reserve off the northwest coast of Australia, includes construction of a three-train liquefied natural gas plant. Project scale, environmental concerns and restrictive procedures for handling equipment and materials make this one of the most complex and demanding projects in the world today. To overcome these enormous challenges, the Kellogg Joint Venture Gorgon is using Bentley's ConstructSim software.

ConstructSim created a virtual construction model by aggregating and updating project data from various systems, enabling the team to define project details at least 18 weeks ahead of construction. It enabled the Gorgon team to automate WorkFace Planning best practices, reducing work package production time by 90 percent. Work packages took 1 to 2 hours instead of over 8 hours each to create, reducing crew idle time, rework, and out-of-sequence work; improving field productivity and safety; and saving millions of dollars.



BE INSPIRED AWARD FINALIST AND SPECIAL RECOGNITION AWARD WINNER

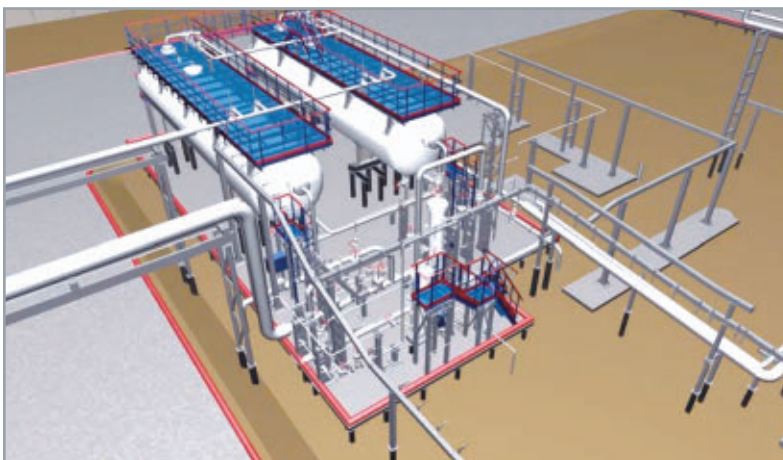
PechorNIPneft

Construction of Booster Oil-refining Station on Bayanduskoe Oil Field

Usinsk, Russia

LUKOIL is an international, vertically integrated oil and gas company. LUKOIL's subsidiary, PechorNIPneft, designed a booster station for the oil refinery at the Bayanduskoe oil field located near Usinsk. The team used a common platform for team member interaction and facilitated the process of coordinating and approving design solutions.

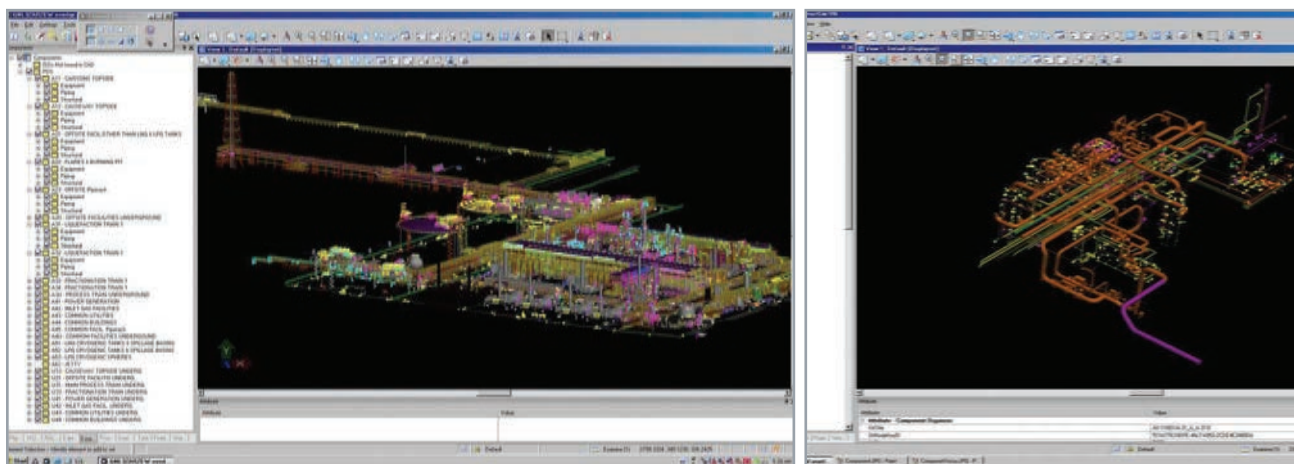
AutoPLANT and Bentley Navigator were used for 3D modeling to reduce design errors and conflicts. ProjectWise was used to accelerate information sharing and communications across the project team. As a result, the time taken to release design documentation for new objects was reduced by 15 to 20 percent.



Saipem S.p.A.
Arzew LNG Train (GL3Z)
 Arzew, Algeria

In 2008, the Algerian oil company Sonatrach awarded Saipem, in joint venture with Chiyoda Corporation, a lump-sum turnkey contract for the new Arzew LNG Train (GL3Z) project. The project encompassed engineering, procurement, and construction of a single-train gas liquefaction plant with a production capacity of 4.7 million tons of liquid natural gas per annum. The USD 39.2 million plant will be completed in 2012.

Saipem obtained numerous advantages from the first-time deployment of ConstructSim on this project. Data stored in multiple systems, databases, and spreadsheets were available in a single repository. Granular details were accessible for project control. The graphic interface aided information interpretation and decision-making. And comparison of planned vs. current project status revealed the impacts of materials availability and other factors.



Wink Companies, LLC
Ergon Propylene De-asphalting Unit
 Vicksburg, Mississippi, United States

To design a ROSE unit based on Kellogg Brown and Root'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, Mississippi, 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.



OIL AND GAS

Y&V Ingeniería y Construcción C.A.

EPC – High Density Polyethylene Plant Expansion

El Tablazo, Venezuela

Y&V Ingeniería y Construcción was contracted to complete all phases from engineering to start-up of the High Density Polyethylene Plant Expansion Project. The objective was to expand high-density polyethylene production from 16 thermal/hydraulic for varied average grades to 20 thermal/hydraulic for grade-specific 7000F polyethylene, maximizing existing facilities usage. As part of Phase I of the Venezuelan Independence Project, which focused on empowering social and economic development, this multi-discipline project sought to maximize the

use of existing facilities and integrate traditional standards with new technology and materials.

Bentley AutoPLANT's 3D modeling capabilities allowed the team to share data and complete various design aspects simultaneously, improving coordination between disciplines and the quality of deliverables. The use of Bentley AutoPLANT helped to reduce design man-hours by a 2.5:1 ratio and construction errors related to design by an 8:1 ratio.



BE INSPIRED AWARD FINALIST

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. The 3D model also supported construction activities; generated as-built drawings; and supported lifecycle design, maintenance, and retrofitting.



POWER GENERATION

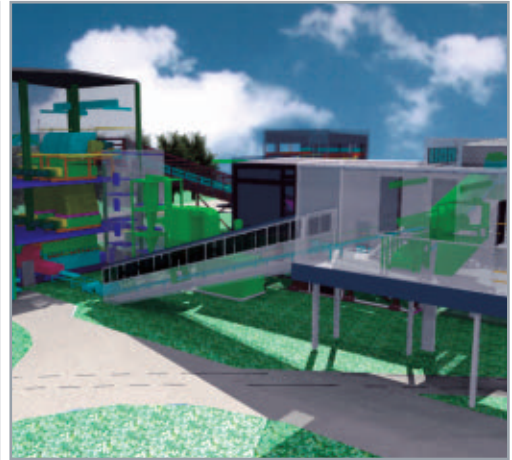
BSPiR Energoprojekt-Katowice S.A.

Patnow I Power Plant – Reconstruction of Units 1 to 4

Konin, Poland

The Patnow I Power Plant has had a considerable impact on the economic development of the Wielkopolska region in Poland. Reconstruction and modernization of the 40-year-old units will sustain their operation for an additional 25 years, increase the power of one unit to 225 megawatts, and meet increasingly stringent environmental requirements. The project comprised more than 500 models of structure, piping, mechanical equipment, HVAC, and cable traces, for which the team used ProjectWise to exchange information.

This large project was divided into separate areas. Architects, engineers, and constructors in each area used a range of Bentley solutions to design multidisciplinary buildings. The design team improved productivity across design disciplines by sharing information more effectively, reducing redesign costs, and reducing project man-hours.



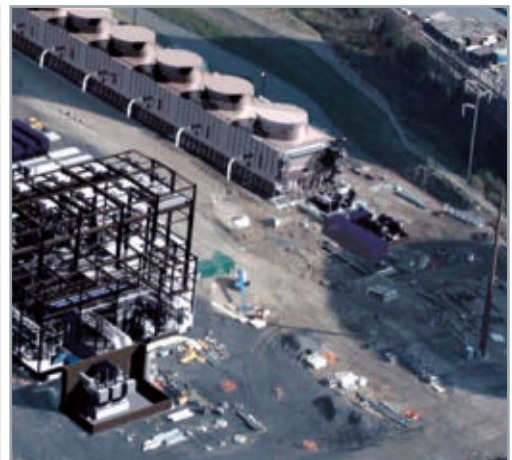
Foster Wheeler Ltd.

Lower Mount Bethel Energy Plant

Bangor, Pennsylvania, United States

The Lower Mount Bethel energy plant meets Pennsylvania and New Jersey's growing demand for electricity. Because the plant burns natural gas to produce energy and steam, the design is among the most efficient and environmentally sound in the current energy market. Successful project completion hinged on the design team's ability to maintain the schedule by limiting the amount of rework.

Using ProjectWise and PlantSpace, Foster Wheeler created a 3D model used throughout the project lifecycle. The design team used the visualizations to secure permits and develop construction sequencing and accessibility studies. The modeling software provided up-to-the-minute information, resulting in fewer interferences and ultimately a more constructible unit. Integration with downstream applications and vendors resulted in the communication of more accurate and complete data sets.



POWER GENERATION

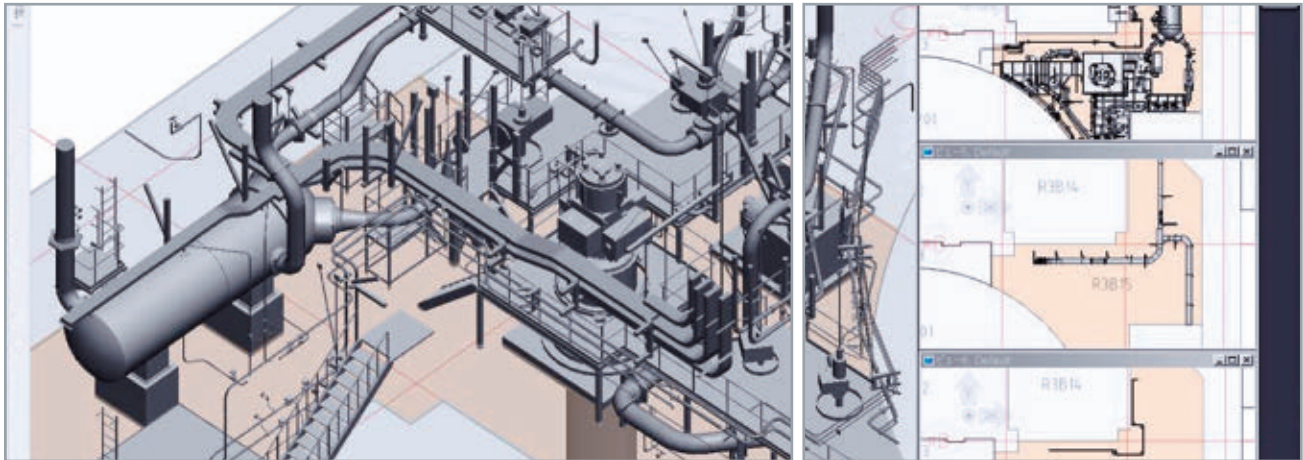
Hitachi-GE Nuclear Energy, Ltd.

Integrated Plant Construction System

Hitachi, Japan

Hitachi-GE Nuclear Energy knows that any error upstream can significantly affect construction downstream; to ensure security they developed an innovative and reliable power plant construction system providing consistent and coordinated control throughout the EPC lifecycle. Improving quality and efficiency via close management and monitoring of field work, Hitachi-GE used Bentley MicroStation to leverage the EPC Integrated system and deploy it to the field.

In this JPY 400 billion project the team at Hitachi-GE worked with the Bentley Developer Network to develop complimentary in-house customization and integration on Bentley products. With the help of Bentley, Hitachi-GE's new system helps support information sharing and communications across project teams in multiple locations.



BE INSPIRED AWARD FINALIST AND SPECIAL RECOGNITION AWARD WINNER

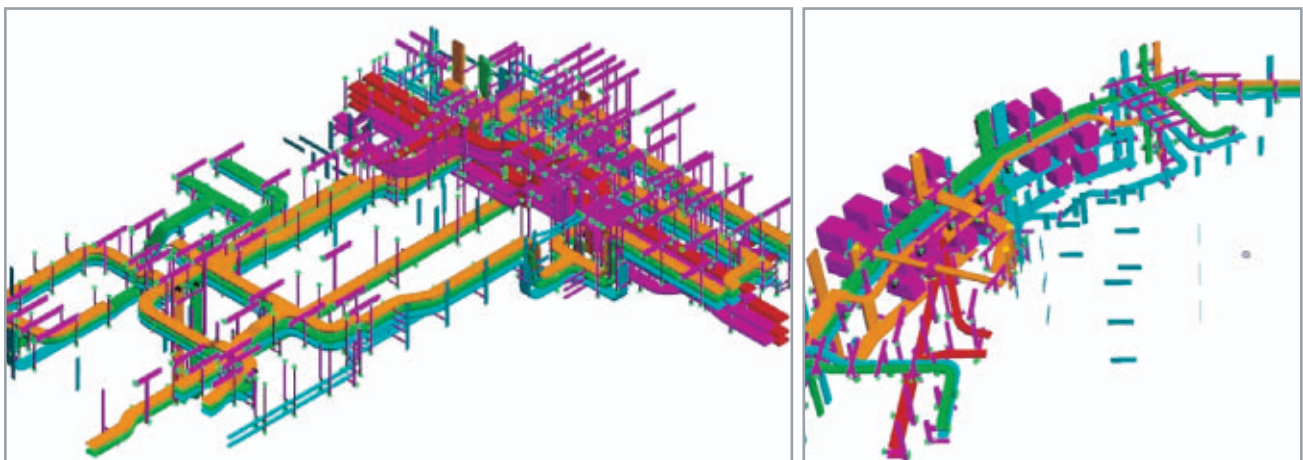
KEPCO Engineering & Construction Company, Inc.

Shin-Uljin Nuclear Plant Units 1 & 2 Project

Uljin, South Korea

The USD 6.3 billion Shin-Uljin Nuclear Power Plant Units 1 and 2 will add 1,400 megawatts of generating capacity to the existing Uljin Nuclear Power Plant in South Korea's Gyeongbuk province. KEPCO Engineering & Construction provided detailed design for the two units and acted as overall coordinator for the 3D design environment.

MicroStation and Bentley PlantSpace were used for electrical design and automatic generation of electrical drawings from the 3D design environment. KEPCO quickly and efficiently generated drawings from the 3D models and met all the drawing requirements for the nuclear power plant. The time savings added value throughout the life of the project.

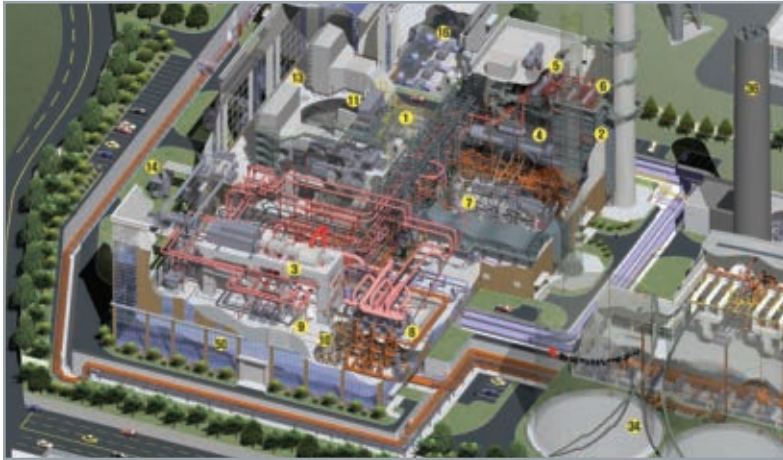


POWER GENERATION

Korea District Heating Co., Ltd Paju Combined Heat and Power Plant Seongnam-si, South Korea

The USD 70 million Paju Combined Heat and Power Plant will supply district heating water and electricity to approximately 57,000 apartments in Paju City, located northwest of the capital city of Seoul. The 515 megawatt power plant was commissioned by the Korea District Heating Co. and has a district heating capacity of 553 gram calories per hour.

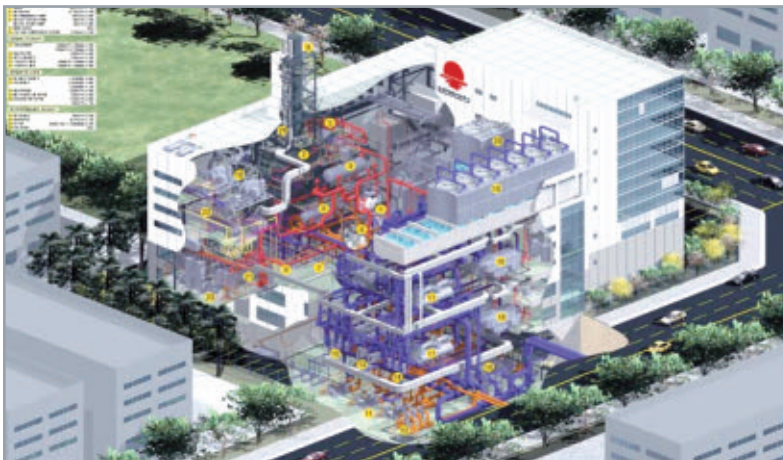
Korea District Heating used MicroStation, ProjectWise, PlantSpace, Structural Modeler, and Bentley Navigator to develop a quality design in consultation with design team members, partners, and the owner. Sharing of the latest information and visual design reviews facilitated collaboration. The solutions significantly reduced rework by enabling interference reviews, which shortened the entire construction period by three weeks.



Korea District Heating Engineering Co., Ltd CES Construction for Southeast Logistics District of Seoul Seoul, South Korea

To maintain district heating service in the southeastern logistics district of Seoul, South Korea, Korea District Heating Engineering Co. upgraded the existing 800 megawatt combined heat and power plant with a new computer engineering system, gas turbine, and refrigeration system. The design cost was budgeted for 20 billion won, with a total construction cost of 200 billion won.

Using PlantSpace the company saved 10 percent in man-hour time and labor, or roughly 40 billion won. PlantSpace increased workflows by 30 percent and reduced rework to less than 1 percent. The interoperable products also enabled the project team to collaborate on the design with the main vendor of the power plant equipment by exchanging 3D modeling files.



POWER GENERATION

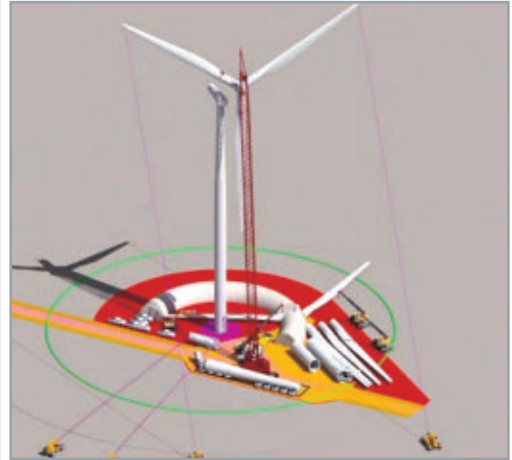
Mortenson Construction

Spring Valley Wind Project

Ely, Nevada, United States

Located on 7,600 acres of land managed by the Bureau of Land Management near Ely, Nev., the Spring Valley Wind Farm's 66 turbines will generate 152 megawatts of wind power. Mortenson Construction modeled each stage of construction to optimize the layout of turbine parts and equipment. Reducing the project footprint minimized the cultural, historical, and biological impact.

Using MicroStation, InRoads, Bentley Map, and Bentley View, Mortenson reduced each turbine site by nearly 40 percent, resulting in a 77-acre reduction in approved ground disturbance area. When identification of pygmy rabbit habitat required a redesign of roads, turbines, and electrical connections, InRoads enabled quick changes and model delivery for machine control grading with no impact on the project schedule.



BE INSPIRED AWARD WINNER

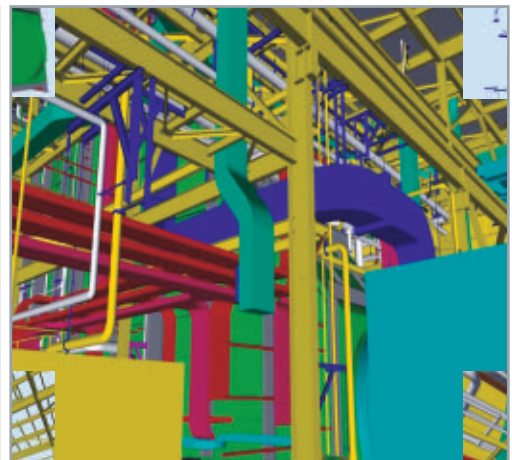
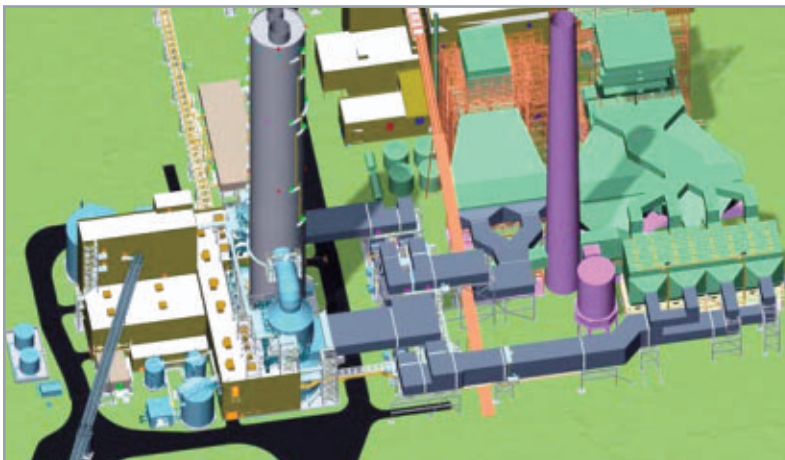
Sargent & Lundy, LLC

Coffeen Wet FGD Unit 1 and 2

Coffeen, Illinois, United States

At more than 40 years old, the two-unit 1,000-megawatt Coffeen power station has gone through various retrofits and modifications to improve its efficiency. To meet the latest federal clean air legislation, it required USD 500 million in modifications to burn high-sulfur coal while meeting emissions standards. Sargent & Lundy developed an optimized design for installing SO₂ scrubbers on both units and a new electrostatic precipitator on Unit 2.

MicroStation, Bentley Structural, Bentley Navigator, TriForma, and STAAD.Pro managed the 3D model and integrated more than 900 models from equipment suppliers. This facilitated accurate and up-to-date internal and external design reviews, interference checking, and design communications. The products also helped construction sequencing to minimize plant outage time and construction costs.



BE INSPIRED AWARD FINALIST

POWER GENERATION

Sargent & Lundy, LLC

J. Lamar Stall Unit at Arsenal Hill

Shreveport, Louisiana, United States

To meet additional electricity demand through 2010 and beyond, the J. Lamar Stall Unit at Arsenal Hill—a 508-megawatt, combined-cycle natural gas-fired plant—is being designed and constructed at American Electric Power's and Southwestern Electric Power Company's existing Arsenal Hill Power Plant site in Shreveport, La. The goal is to add a new power plant that will be a highly reliable, environmentally sound, and an economical resource of electric power to support the region's growing energy demands.

The station is being installed on an existing site within city limits at the site of several older operating units. A primary challenge was fitting all of the plant components into an existing site with unusual boundaries and minimal space. Sargent & Lundy deployed MicroStation, Bentley HVAC, Bentley Navigator, and STAAD.Pro, which enabled model reviews and interference checking prior to construction releases to minimize field changes and stay on schedule.



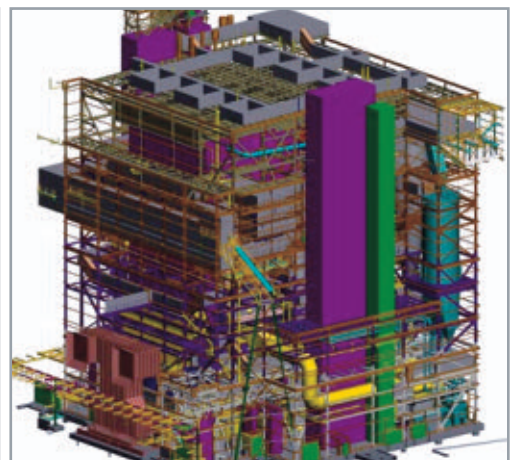
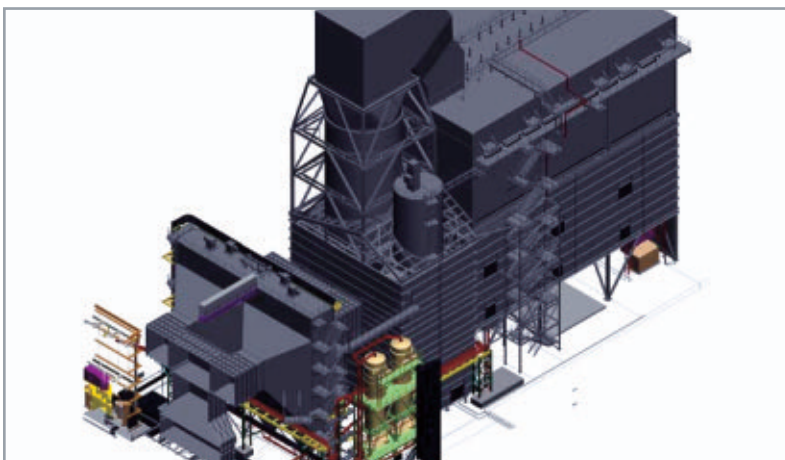
Shaw Power Group

Virginia City Hybrid Energy Center

Virginia City, Virginia, United States

Shaw Power Group was awarded a USD 1.5 billion engineering, procurement, and construction contract for execution of the 585-megawatt circulating fluidized bed (CFB) electric power generation station near St. Paul, Va. Known as the Virginia City Hybrid Energy Center, the project included a 650-megawatt steam turbine generator, two CFB boilers, associated infrastructure, equipment, and vendor-supplied systems.

After initiating the project on MicroStation and Intergraph PDS, Shaw transitioned to Bentley PlantSpace to improve engineering and construction performance. The integrated application suite was implemented while the project was in full swing with no impact on budget or the 58-month schedule. Interferences were resolved during 3D design, and construction was completed with no on-site rework.



BE INSPIRED AWARD FINALIST

POWER GENERATION

Southern Company

Data Quality Manager Implementation ROI

Birmingham, Alabama, United States

Having successfully implemented eB Data Quality Manager to leverage asset information for its USD 2.8 billion Plant Ratcliffe project – a 582 megawatt clean-coal facility with nearly 300,000 assets – Southern Company is now deploying eB Data Quality Manager across its fleet of 70 fossil fuel units. The software ensures that complete and accurate asset information is delivered to the startup and commissioning, construction, and operations and maintenance departments.

Southern Company spent USD 1.8 million over five years to implement the system, but in one year eB Data Quality Manager demonstrated a potential ROI of USD 200 million over 40 years of plant operation via automated document searches vendor data access, and turnover package assignments for Plant Ratcliffe. When it is deployed across its fleet, the company expects to realize a further ROI of USD 1.5 million for a 6,000 asset system over a 20-year system lifecycle.



BE INSPIRED AWARD WINNER

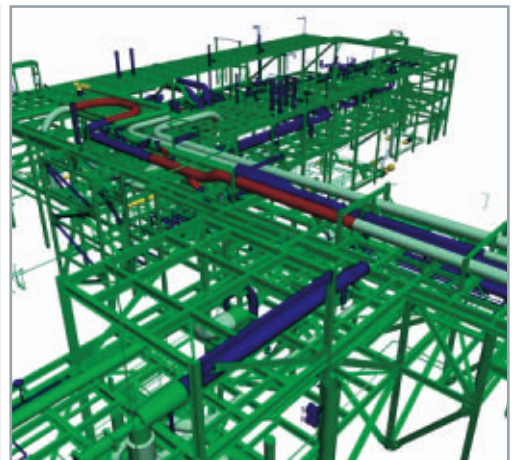
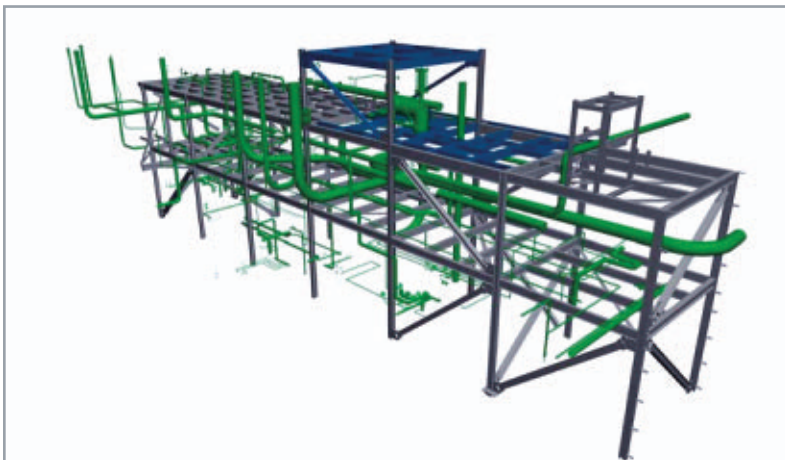
Zachry Industrial, Inc.

Zachry's Use of ConstructSim

Southeastern United States

Zachry Industrial was contracted to perform engineering, procurement, and construction services for a 1,200-megawatt combined-cycle natural gas power plant in the southeastern region of the United States. The USD 348 million project required 3,500 pipe isometrics with 5,800 piping components totaling 121,000 linear feet as well as 5,200 structural steel components with a combined weight of 1,200 tons.

ConstructSim integrated data from Bentley PlantSpace, the schedule model, Zachry's quantity tracking database, and the steel fabricator's CAD model and fabrication status information. Automating material takeoffs and building smart field installation work packages saved an estimated 2,400 man-hours. ConstructSim's integration of engineering, fabrication, and project control data put the project on pace to finish a month ahead of schedule.



PROCESS MANUFACTURING

Carpenterie Ghedesi S.p.A. New Dryer Tower for Zoogamma Casal Buttano, Italy

Zoogamma retained Carpenterie Ghedesi to design, construct, and install two dryer towers for the production of powder serum used in zootechnics, the technology of animal husbandry. The project in Italy included two towers with three product storage silos, and the ancillary structures and services. A challenging schedule was the major obstacle on this USD 4.6 million project.

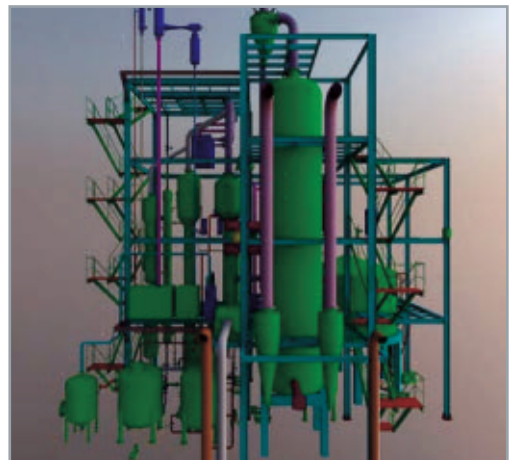
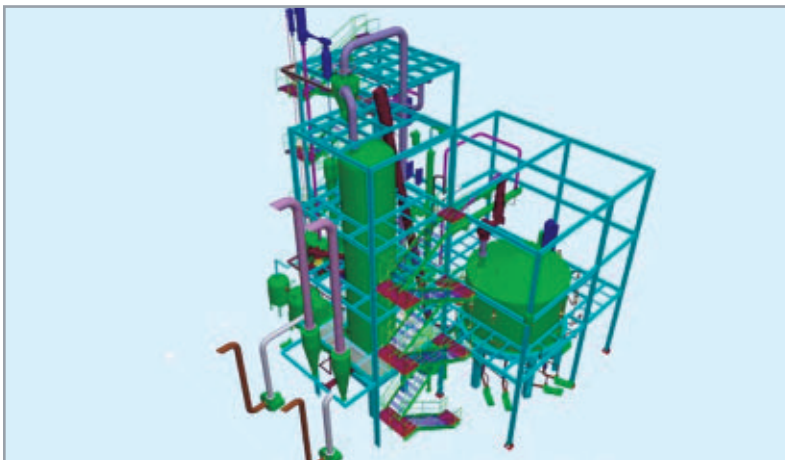
The project team customized ProSteel to create a series of parametric macros that facilitated on-time delivery. The application enabled the team to produce 2D drawings from the 3D model, and then send shop drawings to the fabrication workshop for cutting and drilling of individual pieces. This accelerated the construction phase.



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 carousel 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

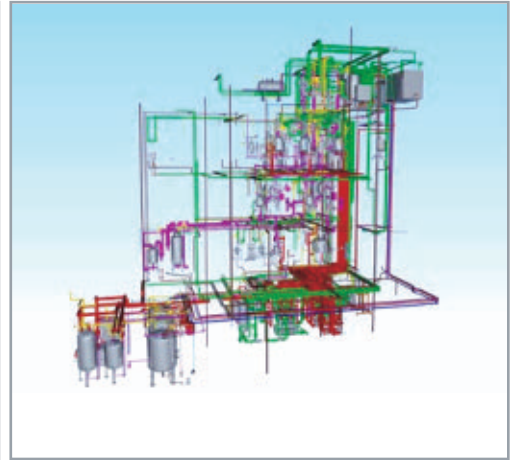
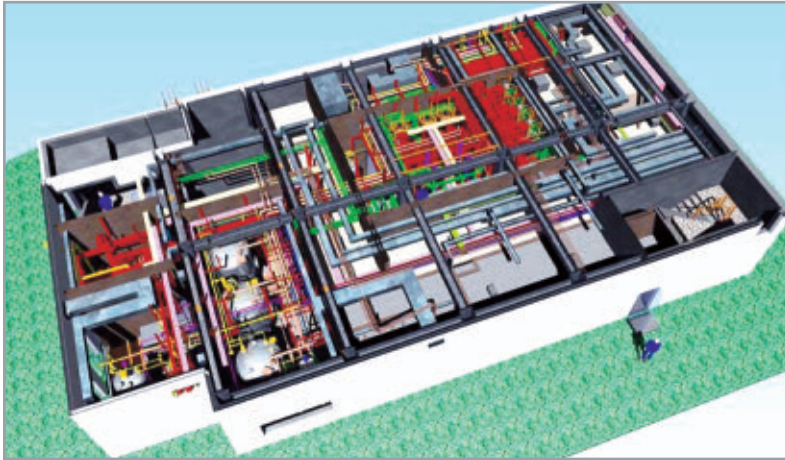
Chemoprag s.r.o.

High Potent APi Facility

Blansko, Czech Republic

Synthron, 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.



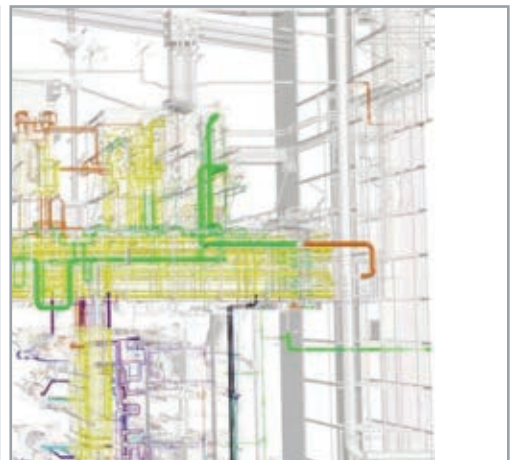
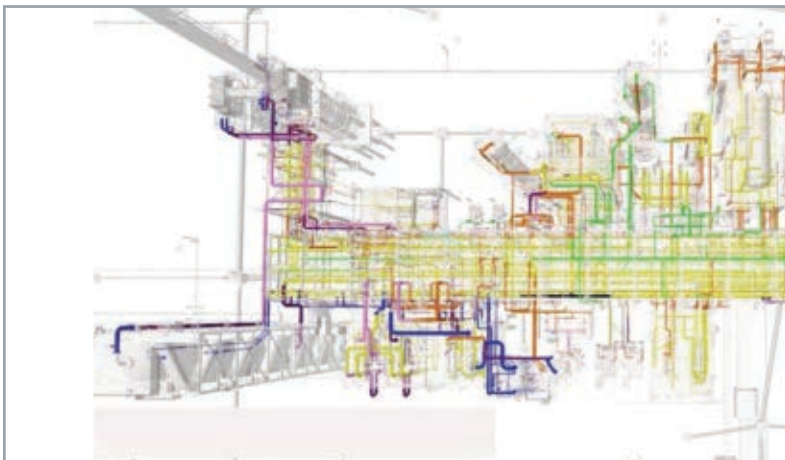
Jacobs

Automating WorkFace Planning

Corpus Christi, Texas, United States

In response to new emissions standards for diesel vehicles, a major oil company contracted Jacobs for engineering, procurement, and construction services on a diesel desulphurizer project on the Gulf Coast of Texas. Cost and safety were the driving factors. To meet the challenge, Jacobs implemented automated workplace planning that integrated project data into an up-to-date, virtual construction model.

The ConstructSim workplace planning system presented key data about drawing availability, fabricated and bulk material availability, and much more, in a clear and concise format. Effectively allowing Jacobs to identify constraints, resolve issues, and accelerate work, saved an estimated 1,000 man-hours, improved productivity by 11 percent, and reduced rework to below 0.5 percent.

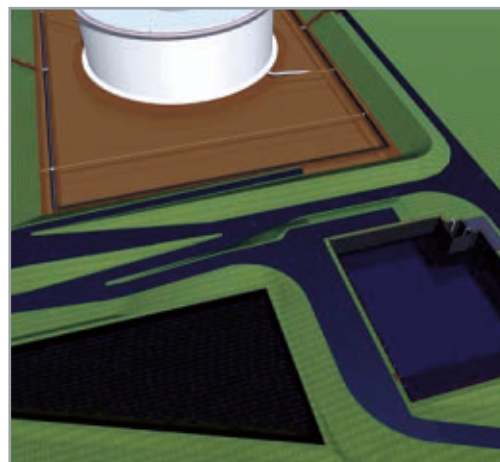
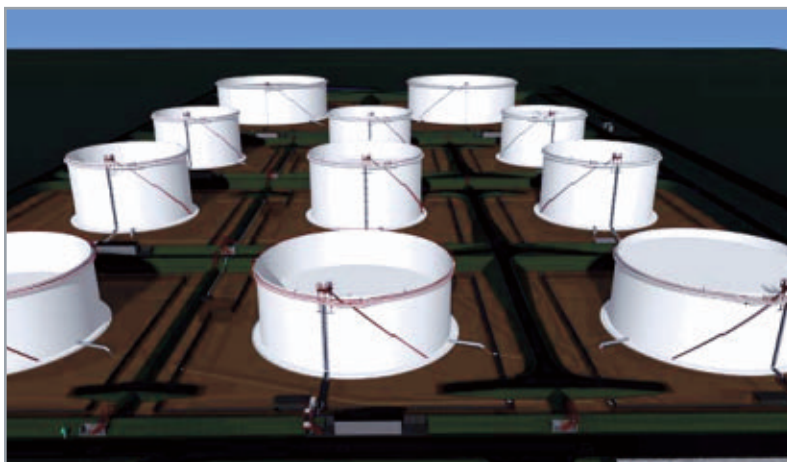


BE INSPIRED AWARD WINNER

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 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.



NIIK Modernization of Carbamide Manufacturing Plant Jonlaukio Ruklos, Lithuania

NIIK has completed a USD 250,000 utility transmission and distribution network project at a carbamide manufacturing plant in Jonlaukio 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

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

At the beginning of this 43-month, USD 18.9-million project, Qatar Petroleum facilities operated on three offshore platforms and one island with no as-built master engineering records. In an effort to better manage assets and maintenance, Qatar Petroleum created a consolidated as-built 2D/3D master engineering record. Aided by a suite of Bentley software, Qatar Petroleum was able to convert all P&IDs to intelligent 3D models, and to extract and update as-built inspection isometrics, piping arrangement drawing, and layout drawings.

Overcoming the logistical restrictions of congested, potentially hazardous offshore facilities with various ongoing projects and large quantities of duplicate 2D drawings and records, ruled out the use of traditional as-built verification. Instead, aided by Bentley software, Qatar Petroleum was able to reverse engineer the facilities view 3D laser scanning, intelligent modeling, and 2D drawing verification.



BE INSPIRED AWARD WINNER

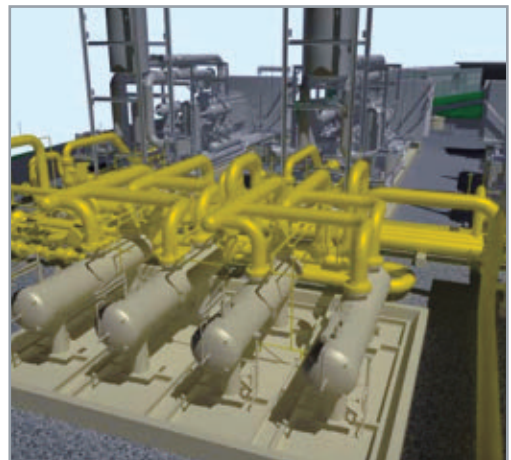
Santiago Engenharia

Tapinha Compression Station

Paraiba do Sul, Brazil

The objective of this USD 75,000 project was to design and build a natural gas compression and pumping station for a new gas line from Rio State to Minas Gerais State in Brazil. Santiago Engenharia provided services from front-end engineering design through construction support. Site constraints imposed by tight environmental controls on deforestation created a major challenge.

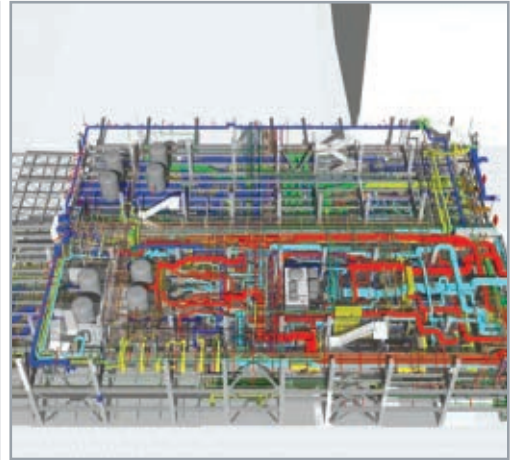
The project team used MicroStation and PlantSpace to develop models based on the international standards used in Brazil. The 3D model was fundamental to success in visualizing the dense piping layout. The desired deliverables such as isometrics and bills of material were generated from the model, saving time and money in document production and construction.



Shinryo Corporation
UNIGEN Inc. Gifu Plant
Ikeda, Gifu, Japan

UNIGEN's JPY 10.5 billion biotechnology-based pharmaceutical production plant in Gifu, Japan, was built in 10 months in order to begin early shipments. The five-story reinforced concrete plant has 14,000 square meters of floor space to accommodate multiple 21,000-liter culture tanks designed for development and mass production. To coordinate construction among the 20 participating companies, Shinryo Corporation was retained to conduct space management.

Using MicroStation, Shinryo created an integrated BIM model that was checked and analyzed by participants in Bentley View. A total of 20 model confirmation meetings were held to avoid interferences, improve production space installability, and achieve high-quality spatial performance. The spatial correlation work on MicroStation was completed in 75 days vs. the anticipated 120 days, helping to meet the goal for construction completion.



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.



BE INSPIRED AWARD WINNER

RAIL AND TRANSIT

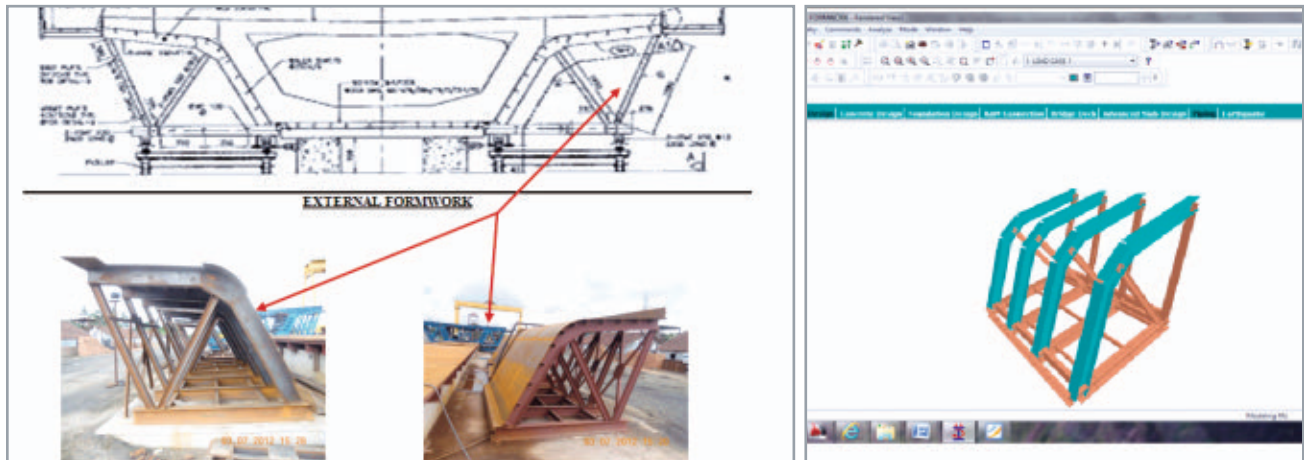
Afcons Infrastructure Ltd.

Metro Rail Viaduct Construction

Kolkata, India

The 11-kilometer metro rail viaduct under construction for Rail Vikas Nigam Limited in Kolkata, India, is being executed in two stages over a period of 30 months. One critical component is the segment casting and erection. Early design of segment formwork and submission for approval was a primary objective.

Afcons Infrastructure designed and analyzed a model of the formwork in STAAD.Pro. This enabled the design team to perform multiple iterations in much less time than typically required, and the optimized design led to considerable savings in material.



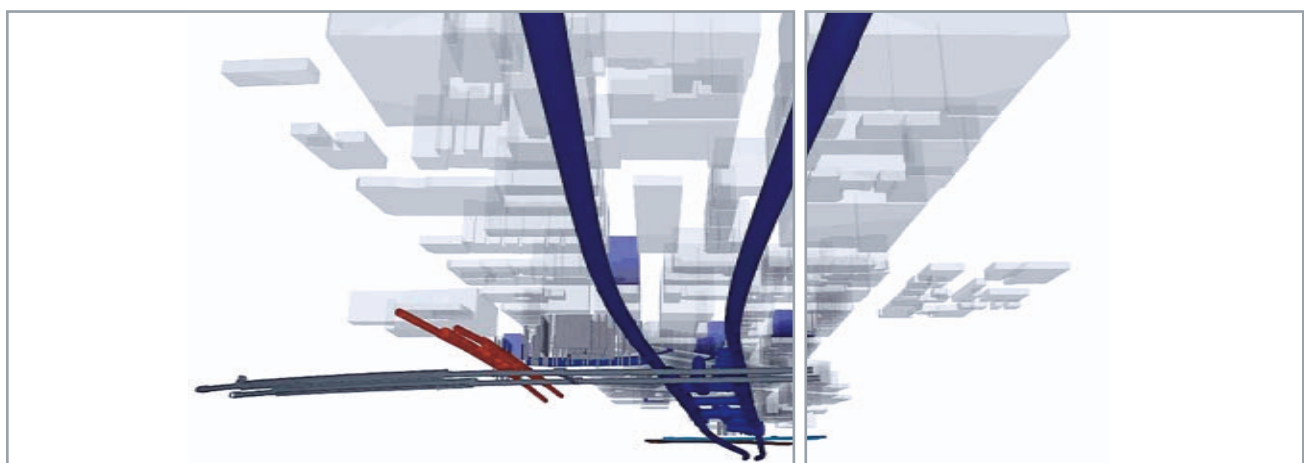
Crossrail Ltd

Crossrail

London, United Kingdom

Crossrail is being built under central London to link network rail lines to the east and west of the United Kingdom's capital. The GBP 14.8 billion project includes 21 kilometers of twin tunnels and multiple below-ground stations. The project demonstrates a federated data approach that links systems and 2D/3D data repositories. Crossrail's strategy incorporates a combination of standards, methods, and procedures as well as software, tools, and hardware.

To ensure integrated data management throughout all phases of the project, Crossrail integrated MicroStation, ProjectWise, Bentley Map, Bentley Geo Web Publisher, glNT, Hevacom, Bentley RailTrack, and STAAD.Pro. The interoperable software provides data management solutions across the Crossrail enterprise. The lifecycle approach saved more than 5,000 man-hours in 12 months on the tunnel project alone.



BE INSPIRED AWARD WINNER

RAIL AND TRANSIT

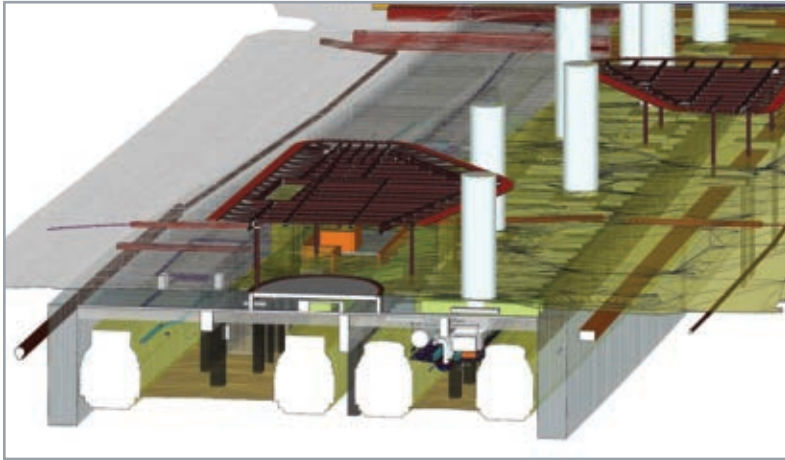
Grontmij

Norreport Station

Copenhagen, Denmark

As the only train station in Denmark, Copenhagen's Norreport Station serves 250,000 metro and rail passengers daily from facilities that were built in 1918. Rail Net Denmark, Danish State Railway, and Copenhagen Municipality undertook modernization of the station, including tunnel renovation, building replacement, and roadway rerouting. Four projects teams were designated to work simultaneously. Each team had well-defined disciplines, workflows, and CAD tools.

Grontmij was responsible for coordinating all the subprojects, as well as performing engineering design on three subprojects. Using MicroStation, InRoads, Bentley Rail Track, Bentley Navigator, and CloudWorx allowed Grontmij to gather files in various formats from different applications and combine them in drawings and 3D models.



BE INSPIRED AWARD FINALIST

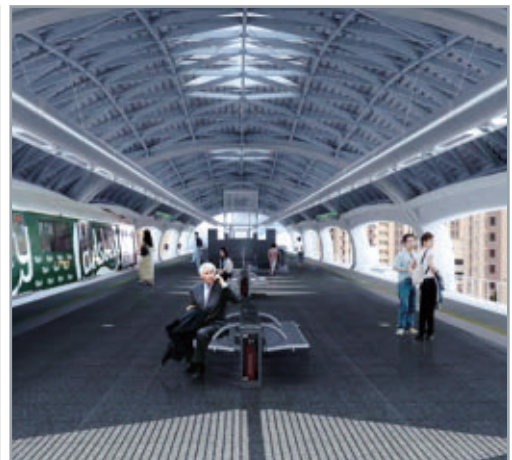
Land Transport Authority

Boon Lay Extension (MRT Line)

Singapore

The Boon Lay Extension is a mass transit project that consists of two identical elevated stations located in the center median. The primary design goal was to have a column-free platform, giving commuters an unobstructed view of incoming trains. To accomplish this, a vault shell structure was chosen for the roof.

The complex roof geometry created multiple nodes, each bringing together six steel sections to form a series of diamond-grid frames. The undulating shape caused every node to connect at a slightly different angle. Structural engineers used the MicroStation 3D model to calculate loads, determine the sizes of the steel members, and detail the node connections that were then later used by the steel manufacturer to fabricate the roof during the construction stage.



BE INSPIRED AWARD FINALIST

RAIL AND TRANSIT

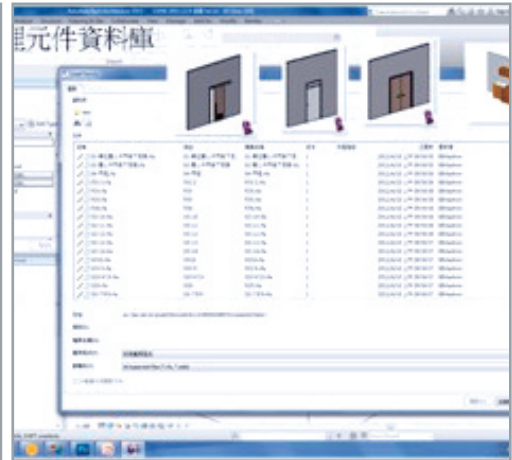
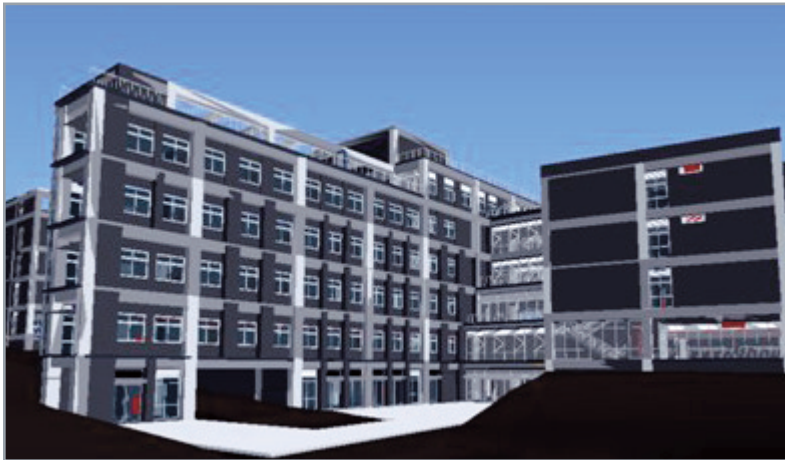
Moh and Associates, Inc.

Collaboration and Integration of ProjectWise

New Taipei City, Taiwan

The challenging design of the USD 50 million Metro Rail Transit station under development in New Taipei City, Taiwan, prompted the project team to introduce building information modeling (BIM) into the design phase. BIM models built using Autodesk Revit were integrated by converting them into compatible Bentley i-model formats, which streamlined document management, file synchronization, and version control.

Moh and Associates implemented ProjectWise to enable efficient collaboration and integration among design disciplines. All project information was classified, stored, and shared through ProjectWise. Efficient model and version control, as well as change management in associated models, contributed to better cost control and construction quality. Improved performance saved 15 percent in man-hours for an annual savings of approximately USD 250,000.



Ove Arup & Partners

Fulton Street Transit Center

New York, New York, United States

Situated in New York City, the USD 1.4 billion Fulton Street Transit Center project will integrate five existing stations and an historical landmark building into a streamlined transport hub. Dubbed the Grand Central of Lower Manhattan, the Fulton Street Transit Center will improve transportation in the area, increase property values, expand business opportunities, improve energy efficiency, and create subway network improvements.

Ove Arup & Partners used MicroStation, Bentley Navigator, and Bentley Apps for the iPad to manage over 3,500 2D drawings over seven years and create a detailed 3D multidisciplinary model that required no changes after an independent engineering review. Clash analysis included all elements – structural, mechanical, electrical, and architectural – and improved design coordination prior to being released to the field. LEED certification is expected.



RAIL AND TRANSIT

Parsons Brinckerhoff

Glenfield Transport Interchange

Glenfield, Australia

New South Wales initiated the USD 2.1 billion South West Rail Link project to improve reliability and capacity on the Sydney metropolitan rail network. Parsons Brinckerhoff is part of the Glenfield Junction Alliance delivering the majority of Phase 1 works, including a major upgrade of Glenfield Station and interchange. The challenge is constructing within a live rail corridor while maintaining passenger and freight operations.

Glenfield Junction Alliance developed staging designs and 3D models using MicroStation, ProjectWise, Bentley Rail Track, InRoads, Bentley Architecture, and Structural Modeler, which helped to optimize and clearly communicate design alternatives for the fly-overs and station. The construction program was accelerated by up to one year and the resulting design improvements saved up to USD 1 million.



BE INSPIRED AWARD FINALIST

Sweco AB

Hallandsås "Live BIM" Railway Project

Förlöv to Båstad, Sweden

The USD 1.5 billion Hallandsås Railway project includes a tunnel section that will increase capacity from four to 24 trains per hour as well as allow the weight of freight trains to be doubled. The Swedish Transport Administration manages and provides template and control files that support building information modeling (BIM), which was implemented to create value during several stages of the project.

Sweco used MicroStation, InRoads, Bentley Rail Track, ProjectWise, and Bentley Navigator as the BIM platform for the railway from Förlöv to Båstad, Sweden. A 3D object library was set up so objects can be reused in future projects, and the project coordination model resolved collisions, improved constructability, and saved time and money during construction.



BE INSPIRED AWARD WINNER

RAIL AND TRANSIT

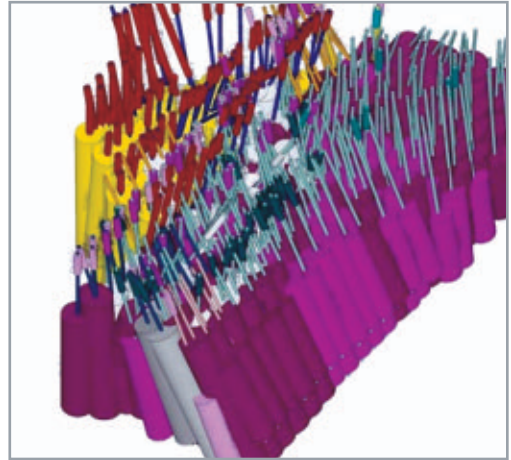
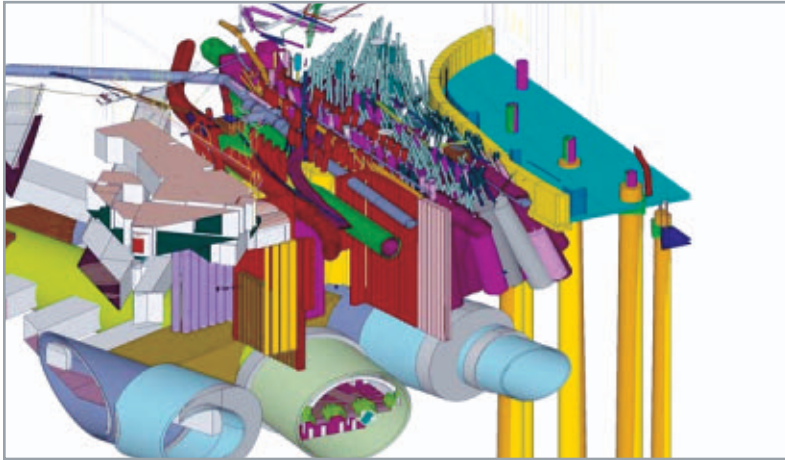
Taylor Woodrow-BAM Nuttall JV

Victoria Station Upgrade Jet Grouting

London, United Kingdom

Eighty million people pass through Victoria Station on the London Underground in the United Kingdom each year. The station upgrade currently under construction includes a series of sprayed concrete tunnels connecting new and existing parts of the station. To make the gravel substrate suitable for tunnel construction, 2,500 jet-grout columns were installed by the Taylor Woodrow-BAM Nuttall Joint Venture in a GBP 37 million work package.

Initial design of jet grout column orientation was carried out using MicroStation. Survey information on the location of services and utilities was fed into the 3D model, column orientations were adjusted, dynamic sectional views were reviewed, and construction planning visualizations were created. Geometry data was transferred from the model to the rig control system, and as-built data was fed back into the model, eliminating data entry errors.



BE INSPIRED AWARD WINNER

The State Highway 161 Phase 4 project in the Dallas/Fort Worth metroplex is a four-lane, 6.5-mile tolled roadway with 45 bridges and two major interchanges. The USD 416 million project is the North Texas Tollway Authority's first design-build project. AECOM is the lead design team and subconsultant to the contractor. All major design elements had to be completed 15 months after notice to proceed.

Using ProjectWise for CAD file management, quality control, and document storage, AECOM coordinated 12 outside subconsultants and connected 210 users in 22 offices throughout the United States. With ProjectWise the company saved more than USD 838,000 in travel, review cycles, and document management and coordination costs, returning 22 times the original investment on this project alone.



BE INSPIRED AWARD FINALIST

Consulting Engineers Group Ltd.

Multai – Chhindwara 2 Laning

Multai-Chhindwara, India

The National Highway Authority of India retained Consulting Engineers Group to conduct a detailed study for the USD 76.5 million upgrade of the State Highway from Multai to Chhindwara. SH-26 traverses plain, rolling, and mountainous terrain with steep gradients and blind curves. The proposed two-lane with paved-shoulder configuration will comply with National Highway standards.

MXROAD was instrumental in analyzing the topography by generating contours along the 98-kilometer corridor. Parametric fitting options optimized milling and resurfacing of the existing highway. Accurate material quantity calculations took 40 percent less time than manual calculations. Optimizing quantities saved up to 1.5 percent of total construction costs.



ROADS

Creighton Manning Engineering, LLP

Route 85 Slingerlands Bypass Extension

Bethlehem, New York, United States

NYSDOT contracted Creighton Manning in a USD 15.2 million bypass extension in Bethlehem, N.Y., addressing mobility and congestion issues on Route 85 by expanding vehicle capacity, relieving congestion, improving safety, and providing acceptable levels of service for the Slingerlands Bypass. New construction was designed in context-sensitive alignment, where 3D modeling was instrumental in mitigating the project's impact on fragile environmental features, historic properties, construction time, and public inconvenience.

Construction on this project included a 1.5-mile, four-lane highway with three roundabouts, the widening of a three-lane bridge to five lanes, and a pedestrian/cyclist bridge. NYSDOT used the Slingerlands Bypass Project as a test of integration automated machine control grading, offered by Bentley InRoads, and Bentley OnSite, which helped to facilitate comparison of alternative alignments and digital terrain models (DTMs). While simultaneously improving work productivity, quality, and accuracy.



BE INSPIRED AWARD WINNER

Foth Infrastructure & Environment, LLC

Cascade Avenue

West Des Moines, Iowa, United States

West Des Moines is a rapidly growing suburb to Iowa's state capital. The Cascade Avenue project, which borders the new headquarters for the world's fifth-largest insurance group, was partially funded by the state program called Reinvesting in Iowa's Sound Economy. The road project consists of a half mile of new construction that will transition from a five-lane roadway with a continuous left-turn lane to a four-lane divided roadway with dual left turns. MicroStation

and GEOPAK developed a 3D model of the corridor for contractors to use in pre-bid estimating and during construction with machine-control grading and earthmoving equipment. This helped produce a lower bid, minimize change orders, and decrease the construction schedule for an estimated 25 percent cost savings on construction.



BE INSPIRED AWARD FINALIST

M.J. Engineering and Land Surveying, P.C.

Route 67 Improvements

Malta, New York, United States

This project involved reconstruction of the Adirondack Northway/Interstate 87 interchange, three additional intersections along Route 67, and replacement of a structurally deficient bridge over I-87 in the town of Malta, N.Y., to significantly improve safety, instill the presence of community by way of a downtown highway corridor, and improve travel time and convenience.

The decision to construct five double-lane roundabouts along a one-mile corridor made this project particularly challenging. InRoads helped overcome initial resistance through effective community outreach that explained construction sequence, traffic control plans, detours, and instructions and safety regarding the use of roundabouts. The software produced an innovative two-lane roundabout interchange design efficiently and accurately.



Maryland State Highway Administration

Intercounty Connector Project

Prince Georges and Montgomery Counties, Maryland, United States

The Intercounty Connector is an 18.8-mile, limited-access, six-lane, tolled highway connecting existing and proposed development areas within central and eastern Montgomery and northwestern Prince George's counties in Maryland. The project team for this USD 2.5 billion project was comprised of five government agencies and the 40-firm Intercounty Connector partners.

A system was required to allow the design-build participants to submit electronically all design and construction documents for collaborative review. The project team deployed ProjectWise as the document handling and storage software to allow for efficient document distribution. The speed and efficiency gained by this system helped maximize the productivity of the various engineering discipline review teams and allowed for a more timely response to the design-build contractors.



ROADS

New York State Department of Transportation

I-87 Exit 6 Single-Point Urban Interchange

Albany, New York, United States

The New York State Department of Transportation (NYSDOT) replaced a diamond interchange and 50-year-old bridge carrying Route 7 over Interstate I-87 in Albany, N.Y., with a USD 43 million bridge and single-point urban interchange (SPUI) that will improve traffic conditions. Designing the state's first SPUI on an interchange bridge was difficult, but the overwhelming challenge was maintaining traffic during construction.

NYSDOT used MicroStation and InRoads to save time and money through efficient data, drawing, and payment documentation sharing throughout design and construction. ProjectWise enabled all teams to share files and information as well as collaborate among multiple teams. MicroStation and InRoads were used to generate the quantities and the pertinent supporting drawings for payment documentation. They were also used in the field by construction personnel for design changes.



BE INSPIRED AWARD FINALIST

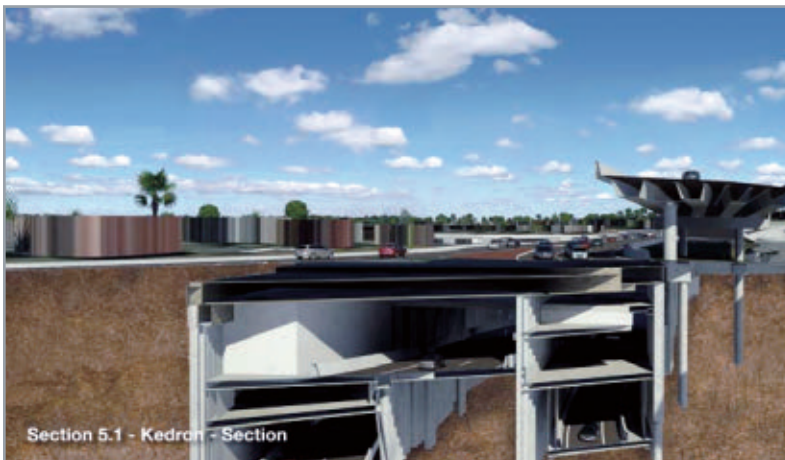
Parsons Brinckerhoff and Arup JV

Airport Link, Northern Busway (Windsor to Kedron) and Airport Roundabout Upgrade

Brisbane, Australia

Arup and Parsons Brinckerhoff formed the PBA Joint Venture to design Australia's largest transport infrastructure project – the AUD 5.6 billion Airport Link, Northern Busway (Windsor to Kedron) and Airport Roundabout Upgrade. Rapid mobilization of the project necessitated fast-track deployment of ProjectWise, which came online within three weeks of the project being awarded in 2008.

ProjectWise ultimately managed 1.5 million documents with 4.8 terabytes of data accessed by over 2,000 users in 40 global locations. The system saved time and costs in locating data (23,000 hours), controlling documents (USD 1 million), updating drawings (260 weeks), and traveling (USD 3.6 million). Other products utilized in the project included ProjectWise, MicroStation, MX, InRoads, glNT, and Structural Modeler.

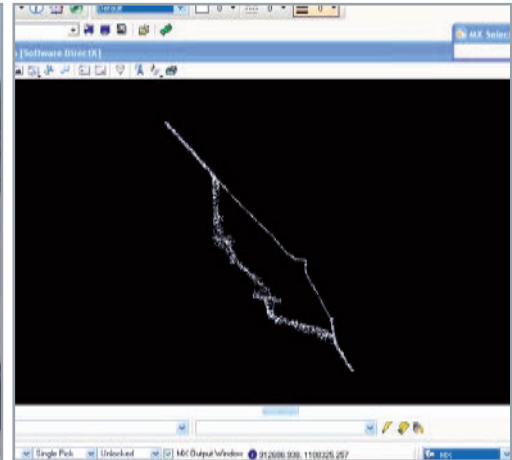


BE INSPIRED AWARD FINALIST AND SPECIAL RECOGNITION AWARD WINNER

RITES Ltd. (Highways) Detailed Project Report for NH 210 Tamil Nadu, India

The National Highway Authority of India initiated the NH 210 rehabilitation and improvement program to sustain economic growth in southeastern Tamil Nadu by reducing travel time and distance between Trichy and Rameshwaram. The USD 161 million upgrades will shorten the drive by nearly 60 kilometers. RITES performed detailed highway design, expanding existing two-lane sections to four-lane divided highways.

MXROAD was used extensively for designing junctions and interchanges, and preparing tender drawings, quantity calculations, reports, and documentation. The software was extremely beneficial for both new construction sections and areas requiring resurfacing and reconstruction. Incorporating these products into the workflows limited design responsibility to only two people.



Scott Wilson India Pvt Ltd NH40 Re-engineering Designs Jorabat–Shillong, India

National Highway 40 from Jorabat to Shillong is a lifeline to India's northeastern states. To improve capacity and safety, the National Highway Authority upgraded the 31.7-kilometer, two-lane road to a dual two-lane controlled access tollway. Scott Wilson India developed detailed engineering designs, including highway alignment to a design speed of 50 kilometers per hour, nine bridges, 187 culverts, and one overpass.

Using MXROAD to design, visualize, and refine the alignment enabled consideration of multiple alternatives to avoid deep valleys and hillocks, and retain existing two-lane bridges in good condition. MXROAD also ensured design updates were reflected in final drawings and deliverables. The 3D capabilities reduced design cycle time by 40 percent. Collaboration through ProjectWise reduced errors, which saved 20 percent in construction costs.



STRUCTURAL ENGINEERING

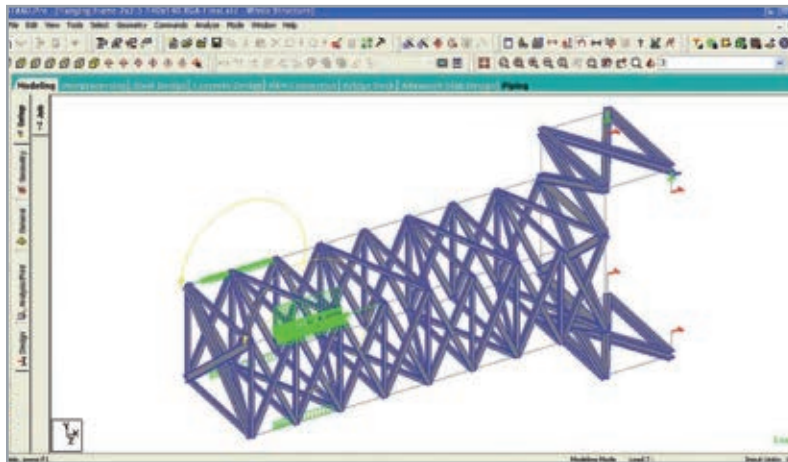
Afcons Infrastructure Limited

Construction of Access Jetty

Port of Toamasina, Madagascar

Construction of a USD 60 million access jetty at the Port of Toamasina, Madagascar, involved installing the jetty and mooring structures beyond an existing jetty. Afcons used two steel barges as the platform for driving 400 steel pipes of around 1,200 millimeters in diameter. A hydraulic piling gantry was chosen as the pile driver.

Afcons built an analysis model for the piling gantry to simulate loading and boundary conditions in the field. STAAD.Pro allowed the project team to create numerous iterations of load cases and arrive at a final solution in about 15 days as opposed to the two months it would have taken using alternative methods. STAAD.Pro yielded accurate results and the gantry performed as expected.



Afcons Infrastructure Ltd.

Jammu-Udhampur Section Construction

Udhampur, India

This USD 291 million project involved construction, rehabilitation, and expansion to four lanes of NH-1A from Jammu to Udhampur in India. The section required 67 bridges to be constructed in difficult terrain. Afcons Infrastructure determined that a uniform bridge deck structure was needed and selected 20-meter pretension I-girders. The cost-effective solution involved launching the girders with a launching truss.

Afcons Infrastructure constructed an analysis model in STAAD.Pro to simulate the kinematics of the launching truss by providing the correct loading and boundary conditions. This required testing numerous load cases, a process that took two weeks as opposed to the two months it would have taken using an alternative means of analysis. The STAAD.Pro simulation successfully predicted the actual performance of the structure.

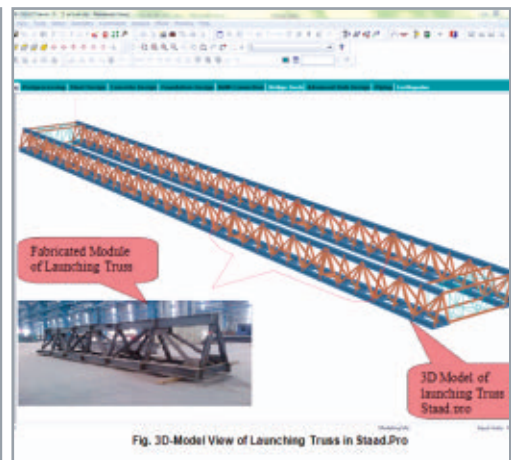


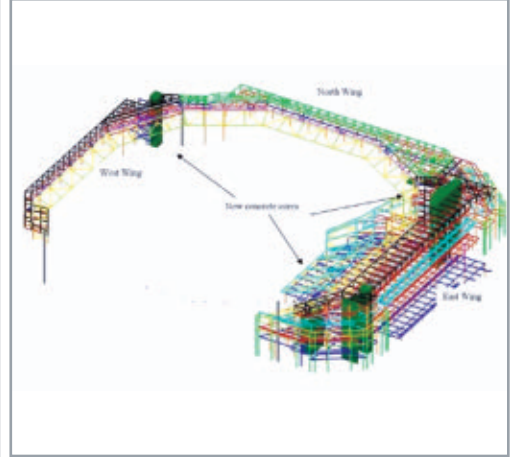
Fig. 3D-Model View of Launching Truss in StAAD.Pro

Wimbledon Centre Court Redevelopment and Retractable Roof

Wimbledon, United Kingdom

The All-England Club, home of the Wimbledon Championships, is located in a London suburb and recently underwent a four-year improvement. As part of this program Edge Structures Ltd was contracted in the design process of critical redevelopment of the east stand of center court, extending the terrace for additional seating, and adding a retractable roof. The short time frame given to the multidisciplinary team was based around the annual Wimbledon Championships and remained imperative for maintaining the quality experience of athletes and

onlookers; speed was crucial. To overcome this obstacle Edge Structures used Bentley software to design a piecemeal approach to building where 3D modeling of prefabricated modules for use in the building process key. Bentley 3D software allowed collaboration of various professionals while displaying work-in-progress in 3D, also allowing Edge Structures, a relatively small practice, to complete the design with fewer resources.



BE INSPIRED AWARD WINNER

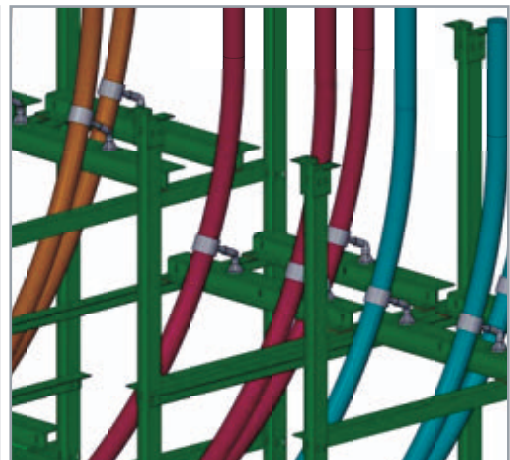
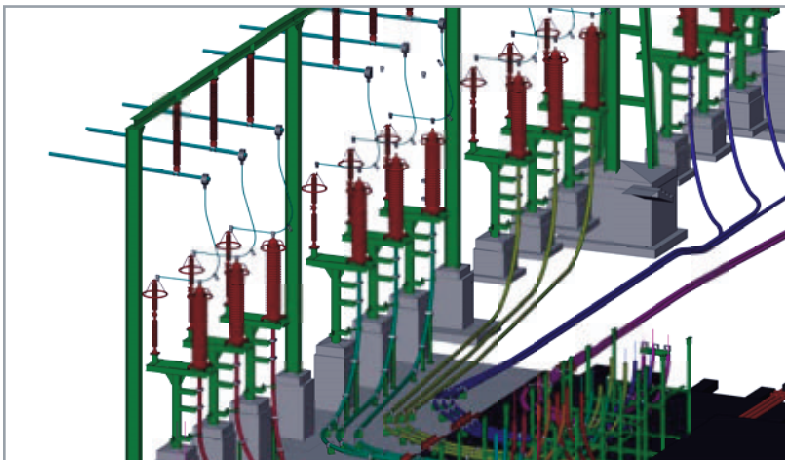
Fabricom GDF Suez

3D Study Station 220 Kilovolts of Seraing

Seraing, Belgium

Fabricom provides innovative technical installations and services for the energy industry in Belgium and throughout Europe. The substations department of the high-voltage division develops and installs electrical substations of up to 420 kilovolts.

The USD 1.76 million project in Seraing included design of supports, cables, and steel structures for a new 220-kilovolt gas insulated switchgear substation. STAAD.Pro and ProSteel were used for the design and construction of steel structures as well as for the implantation of all materials.



STRUCTURAL ENGINEERING

Pedelta Colombia

Piñal Stayed Bridge

Buenaventura, Colombia

Located in the Valle del Cauca region, Buenaventura is the main seaport of Colombia. The administration wanted to build an emblematic bridge for the city's main entrance. Pedelta Colombia designed a truss structure with two truss planes in the extreme part of the board and cargo masts inclined backward by 10 degrees and laterally by 5 degrees. These masts are 110,372 feet high with the trusses placed in a fan shape.

To study the bridge behavior during construction, the designers used RM Bridge. This parametric program allowed the team to easily change the geometry on different sections of the board, rigid trusses, and masts. It also allowed changes to be made in construction procedures. The ability to make changes quickly and easily helped to reduce costs for this USD 6 million project.



WATER AND WASTEWATER

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. The ZLD plant is a fully integrated, 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.



Carollo Engineers, Inc.

Post Point Wastewater Treatment Plant Improvements Project

Bellingham, Washington, United States

The City of Bellingham, Wash., is designing USD 47 million in primary and secondary improvements to its Post Point Wastewater Treatment Plant in anticipation of exceeding current capacity. Located on a site overlooking neighborhoods, the plant serves 100,000 people. Nearby wetlands and natural habitat make expansion challenging, so communicating how stakeholder concerns are being addressed was crucial.

Carollo Engineers used MicroStation, ProjectWise, Bentley Navigator, STAAD.Pro, Bentley Architecture, Structural Modeler, InRoads, and the Luxology rendering engine to enhance coordination and collaboration, with building information modeling as the essential tool for minimizing construction-related operating problems at the existing plant. The integrated 3D model helped evaluate constructability, scheduling, and quantities.



WATER AND WASTEWATER

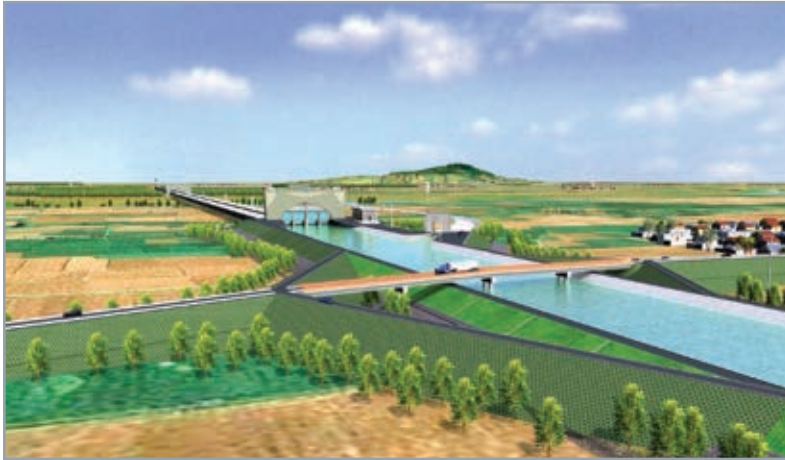
Henan Water & Power Engineering Consulting Co., Ltd

Shahe Aqueduct Project

Pingdingshan, Henan, China

The Shahe Aqueduct in Henan, China, is part of the Middle Route Project for South-to-North Water Transfer – a Government initiative that will divert water from Danjiangkou Reservoir to Beijing. The CNY 2.75 billion aqueduct will help alleviate water shortages in the Beijing-Tianjin region. Extending 11.96 kilometers and crossing eight rivers, it is also the largest aqueduct project in the world.

Henan Water & Power Engineering Consulting implemented Bentley's 3D solutions to develop coordinated designs and construction methods. Products included MicroStation, AECOsim Building Designer, GEOPAK Civil Engineering Suite, Bentley Navigator, and ProjectWise. By shortening the design phase to four months, Bentley solutions saved about two months and CNY 2 million. 3D modeling was used to simulate construction, troubleshoot the processes, and optimize the solution, thereby improving productivity and reduced costs.



SPECIAL RECOGNITION AWARD WINNER SUSTAINING OUR SOCIETY

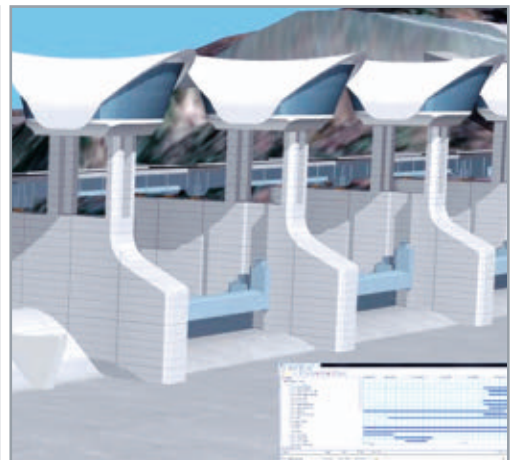
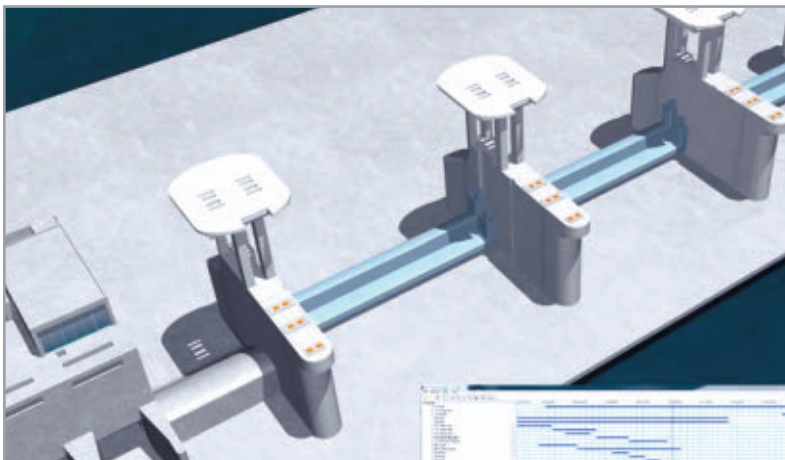
IDM E&C

Four Major Rivers Restoration Project

Gyeonsangnam-do, South Korea

This USD 3.8 billion restoration initiative in the Nakdong River area of South Korea is a highly visible infrastructure construction project. Bentley Navigator provided the tools to simulate construction activities and plan the schedule, which provided a web-based construction schedule management system that allowed the client to review the process from remote locations.

Using Bentley Navigator enabled IDM to precisely and rapidly build a 3D model that communicated the construction plan to the local community. The system helped to control costs and reduce construction time, which will contribute to delivering the project ahead of schedule so that the infrastructure can begin to benefit the local economy.

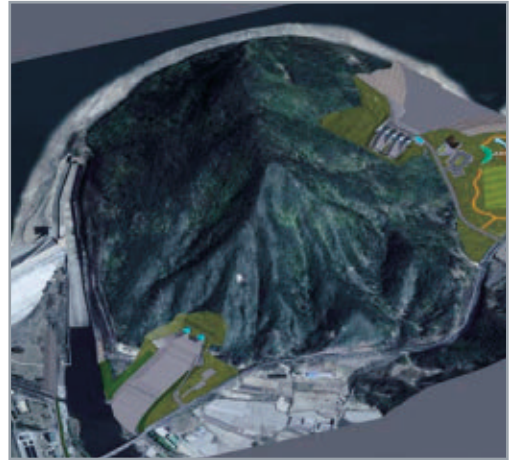
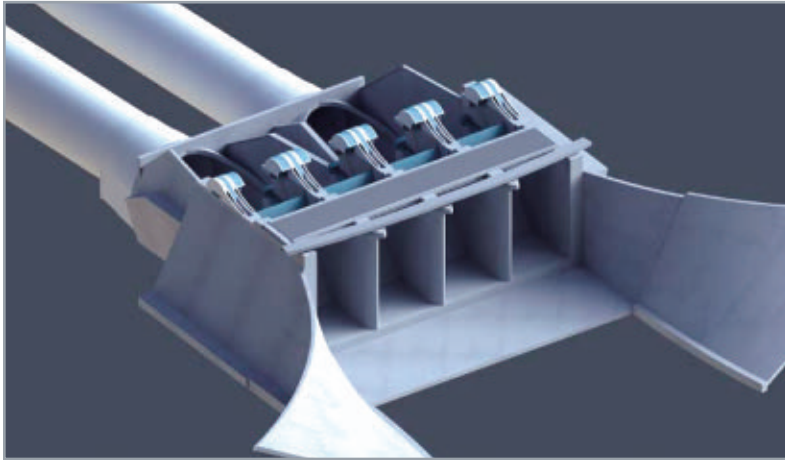


Woonmoon Dam Auxiliary Spillway

Daecheon-ri, South Korea

Located in North Gyeongsang Province, South Korea, Woonmoon Dam is threatened by unpredictable weather such as typhoons. A USD 87 million, tunnel-type auxiliary spillway is being constructed to improve dam safety and minimize environmental disruption. At 14.4 meters in diameter and 600 meters in length, the spillway required innovative construction methods to be completed within the tight schedule.

IDM E&C developed 4D construction simulations to demonstrate equipment operations and procedures, and gather ideas for reducing costs and equipment idle time. Digital terrain models were used to demonstrate coinciding cut-and-fill activity. The firm used MicroStation for 3D modeling, construction schedule, and method simulation; GEOPAK for 3D terrain modeling; and Bentley Navigator for construction simulation demonstration.



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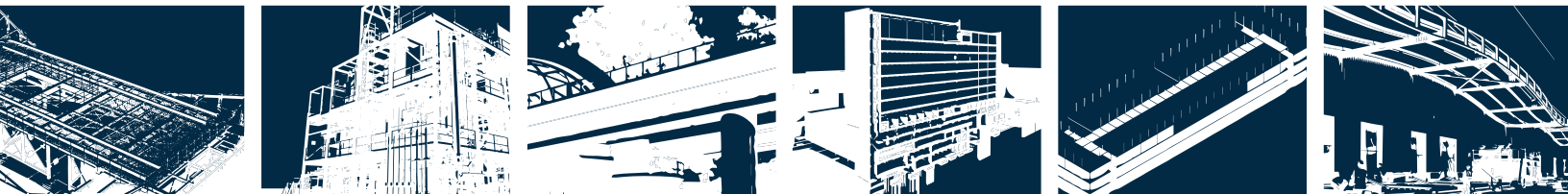
NOTES



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 Construction 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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