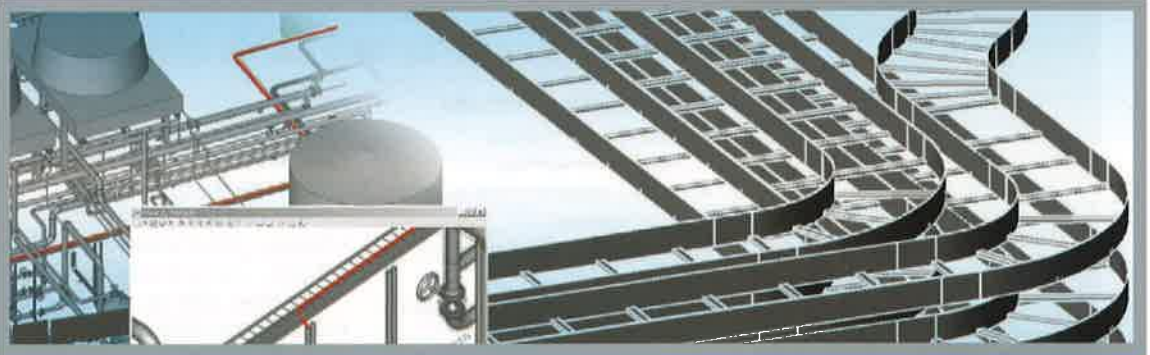
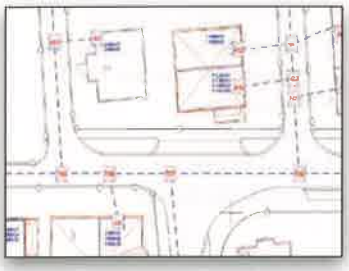
PRODUCT DATA SHEET



Bentley® Raceway and Cable Management V8*i*

The first and only comprehensive, integrated system for raceway design and cable management

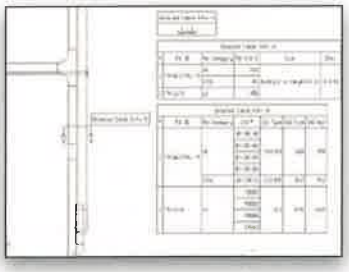
Designing complex raceway and cable systems used to require multiple software products to handle the wide range of design and documentation tasks typically involved. Today, Bentley Raceway and Cable Management provides complete layout, routing, and material estimating functions in a single, integrated system. It creates the framework for an effective workflow spanning all phases of the design, from initial concept to detailed layout and construction, saving time and reducing costs.



Bentley Raceway and Cable Management allows users to create a conceptual design to define main raceway routes and calculate space requirements.



A 3D detailed raceway design makes complex systems easy to visualize and provides precise quantity take-offs.



With Bentley Raceway and Cable Management, users can automatically generate 2D extractions from the 3D model for construction documentation.

Conceptual Design Facilitates Early Project Planning

Bentley Raceway and Cable Management features a conceptual design mode for a project's early stages. Users can define equipment nodes in the facility, assign equipment tags to the nodes, and define the required raceway routes to connect them. Automatic raceway sizing takes into account the number and type of cables routed between each equipment node. Users can generate bills of quantity for placing early orders, and can also provide material and space estimates to other disciplines collaborating on the overall facility design. As additional information becomes available, it is easy to update the conceptual design. Data is available at any time for use in the 3D detailed design mode.

Detailed Design Enables Accurate 3D Layouts

The detailed design mode allows the user to create an accurate 3D model of the raceway system. Intelligent drawing functions allow raceway sections to be placed and manipulated quickly and easily. With multi-routing, users can place multiple parallel raceways simultaneously. The raceway display can also be filtered by categories such as voltage level, making it easier to visualize complex installations.

Users can also place and configure electrical equipment, including the layout of equipment inside each cabinet. This facilitates accurate cable length calculation and connection information.

Each object in the model is linked to the parts database, providing accurate component data. The 3D model makes it easy to ensure that adequate space and clearances are available, preventing costly construction delays. Users can automatically extract 2D construction deliverables of the detailed design.

Cable Routing Functions Save Time

As cables are defined between two equipment nodes, the software can automatically determine the best route through the existing raceways. This routing takes into account not only distance, but also the types of cables that are permitted in each raceway and the available capacity and weight that can be carried by the raceways. Users can quickly determine when the size or number of raceways needs to be adjusted.

Automatic Report Generation Helps Keep Project on Schedule

At any point in the conceptual or detailed design process, the user can automatically generate output including bills of quantity, bills of material, raceway schedules, cable schedules, and cable pull cards. The ability to quickly generate accurate material estimates is vital for placing orders in a timely manner to keep the project on schedule.

Integration with Other Bentley Products Allows for Collaboration and Effective Use of Design Data

Bentley Raceway and Cable Management can exchange data with other Bentley products to eliminate data re-entry. For example, cables defined in Bentley Substation can be brought into Bentley Raceway and Cable Management, without re-entering cable tags and connection information, saving time and preventing errors.

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Fax +603-8073 2688
Email enquiry@hertfordsystem.com

System Requirements

Hardware Prerequisites
Processor:
Intel or AMD processor, 2.50 GHz or greater

RAM:
Minimum 4 GB or more recommended

Hard Disk:
650 MB free hard disk space minimum

Video:
Graphics card supported by DirectX 9.0c, 512 MB of video RAM is recommended. If insufficient video RAM or no graphics card supported by DirectX can be found, MicroStation® attempts to use software emulation. For optimal performance, graphics display color depth should be set to 24 bit or higher.

Software Prerequisites
Operating System:
Windows 7 (32 or 64 bit), Windows XP Professional (SP2 or later)

Database:
Supported SQL Server Versions: SQL Server 2005, SQL Server 2008, and Express Editions of 2005 and 2008

ProjectWise (optional):
ProjectWise® Server 8.11.7 with ProjectWise Explorer 8.11.7.133 or higher, ProjectWise Server 8.11.9 with ProjectWise Explorer 8.11.9.

Find out about Bentley at: www.bentley.com

Contact Bentley
1-800-BENTLEY (1-800-236-8539)
Outside the US +1 610-458-5000

Global Office Listings
www.bentley.com/contact

Bentley® Raceway and Cable Management V8*i* At-A-Glance

General/System Features
- Bentley SELECT licensing
- Project-based workflow
- Project manager for global settings, file management
- Collaboration manager (to control access)
- Configurable Excel import module for existing design data
- Concurrency control
- Client/server architecture
- Change management

Conceptual Design
- Work preparation: import cable lists, load lists, node map
- Build node model – place equipment nodes and routing nodes
- Routing – auto-connect nodes, refine cable routes
- Specification – size cables, analyze model, specify raceway material and accessories, specify space allocation
- Reports – cable pull cards, cable list, cable drums, BOM, etc.
- 3D space allocation

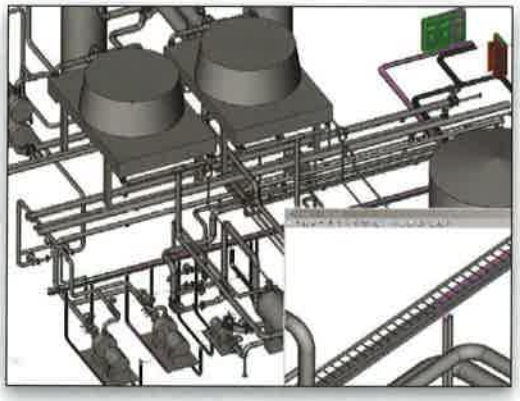
3D Detailed Design
- Raceway – raceway modeling, raceway categories, dividers, raceway IDs, raceway accessories, fix air gaps for auto-routing
- Work preparation – import cable lists, load lists, node map
- Equipment – equipment modeler, place equipment (junction boxes, cabinets, etc.), associate target IDs
- Routing – manual and automatic
- Reports – cable pull cards, cable list, cable drums, BOM, etc.
- 2D extraction – 2D drawings, cross section details and annotation, parallel section details and annotation

Raceway Functions
- Parametric raceway engine
- Interactive raceway routing
- Raceway generator
- Raceway ID tools
- Raceway modification tools (insert, cut, extend, edit properties, etc.)
- Cable fill calculation
- Hangers

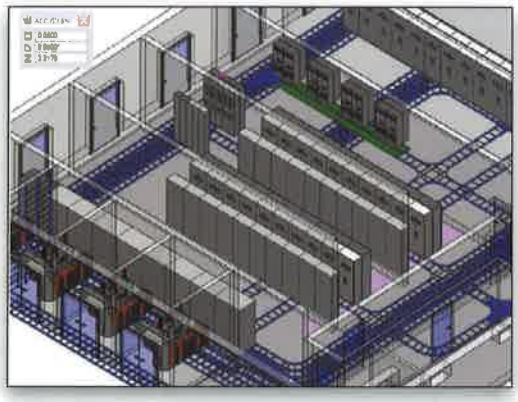
Cable Management & Routing Functions
- Cable manager
- Cable definition via direct input or imported XML and XLS file
- AutoRouter (automatic routing)
- Cable routing by category
- Cable routing – constraint driven
- Cable routing – edge/node routing
- Tray divider support
- Cable length calculation
- Cable sizing by length and load
- Cable fill and weight calculations
- Cable connection import from Bentley Substation via i-model

Reports and Other Output
- Bill of quantity
- Bill of materials
- 2D extractions – sections with dynamic details
- Cable lists
- Cable pull cards
- Cable schedule report
- Cable drums
- Raceway schedule report
- Cable status list
- Raceway fill with cables report
- Cable markers

Design Content
- Cable libraries by manufacturers
- Conduit libraries – trade sizes and manufacturers' specialty libraries
- Tray libraries
- Ladder libraries
- Basket libraries
- Conduit body libraries



The 3D modeling software allows manual and automatic cable routing based on user-definable constraints.

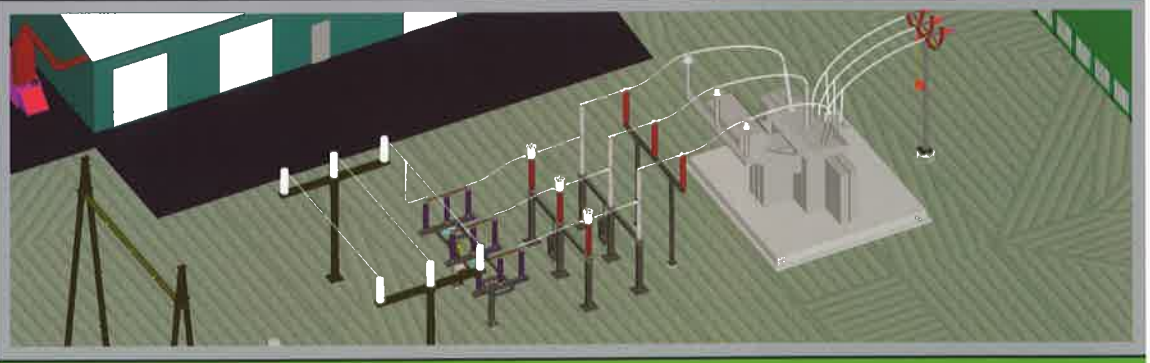


With Bentley Raceway and Cable Management, users can place raceways and electrical equipment to create a comprehensive design.

Bentley
Sustaining Infrastructure

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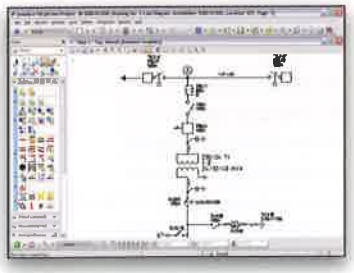
PRODUCT DATA SHEET



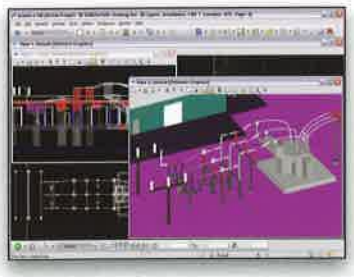
Bentley® Substation™ V8*i* (SELECTseries 7)

Integrated Electrical and Physical Design for Intelligent Substation Infrastructure

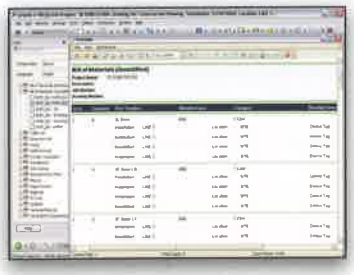
Designing or upgrading an electric substation is a complex task that combines the placement of physical objects and the distribution and control of electrical power. Bentley Substation addresses this challenge by providing a comprehensive, integrated set of capabilities that make the design process faster, easier and more efficient. Bentley Substation is a valuable productivity tool for utilities, engineering firms (EPCs), and rail owner-operators who design and operate substation infrastructure.



Intelligent electrical design – create one-line drawings, protection and control schematics, and panel layouts.



3D modeling – visualize your design for clash detection, clearance checking, and presentations.



Automatic report generation – create an accurate bill of materials and other lists based on the content of your drawings.

Intelligent Information Model

Using an intelligent information model, Bentley Substation combines intuitive 3D modeling, powerful electrical design functionality, and automatic bill of material and report generation in an integrated, standalone application to get your project completed, approved and online in the shortest possible time. The product operates in conjunction with ProjectWise®, a powerful engineering content management system, to facilitate the design workflow.

3D Physical Design

A 3D model makes it much easier to visualize and document substation plans, create accurate bills of material and execute clash detection and clearance checking. In the past, 3D models were often omitted from substation designs due to the complexity of the required software, but Bentley Substation offers new, easy-to-use 3D modeling tools. Each object in the model is linked to the parts database, providing component data and the contents of any accessory kits associated with the part. Hook points connect related objects, so they automatically snap together and move as one unit when repositioned. Dynamic Views show 2D and 3D edits simultaneously. There are also tools to design or analyze the grounding grid, lightning protection and cable sag, as well as enhanced capabilities for visualizing and confirming existing stations. Bentley Substation supports workflows for brownfield expansion and retrofit projects, using a combination of 2D existing designs, 3D models and point clouds.

Electrical Design

Bentley Substation incorporates an established electrical design engine (promis•e®) which provides many time-saving functions. Wires break and heal automatically as symbols are placed or removed. Wire numbers can be assigned automatically and connections are recognized by the software. Unique IDs are prompted by the software, and related symbols are cross-referenced automatically. In this way, you can generate single line drawings and protection and control schematics quickly without errors. As with the 3D model, the integrated parts database allows you to associate components in your design with specific parts information to generate an accurate bill of material and other documentation.

Work is organized into projects, allowing many drawings to be linked for cross referencing, error checking and list generation. Changes made in one part of the project are immediately reflected in the rest of the project, drastically reducing editing time and ensuring accuracy. Project-wide default settings ensure adherence to standards.

Error Checking

As you create drawings, Bentley Substation alerts you to possible errors. This significantly reduces manual checking, improves the overall accuracy of the drawing and prevents costly corrections later on. Error conditions include short circuits, duplicate device identifiers, over-assignment of contacts, and more.

Automatic Generation of Documentation

Superior documentation is provided by a project database linked to the schematic, allowing bills of material, purchase order lists, job cost estimates, panel layouts, terminal plans, wire lists and wiring diagrams to be generated automatically. This automatic creation of documentation minimizes errors and ensures that any design revisions are quickly reflected in the reports.

Distributed Engineering

As the design work for a substation typically involves people working at different locations, there is a need to coordinate this activity to avoid errors and delays. The i-model support built into Bentley Substation facilitates data exchange. In addition, ProjectWise software provides robust enterprise-level engineering content management and team collaboration capabilities to support the substation design workflow.

System Requirements

Software:
Microsoft Windows XP or Windows Vista or Windows 7 (32 bit version or 64 bit version*), Supports Oracle 10g or 11g servers, SQL Server 2005 or SQL Express 2005, and SQL Server 2008 databases (an express version of SQL Server is included)

Memory:
4 GB recommended

Hard Disk:
650 MB free hard disk space minimum

Video:
Graphics card supported by DirectX 9.0c

*On 64 bit version of Windows Vista or Windows 7, Bentley Substation runs as a 32 bit application

Find out about Bentley at: www.bentley.com

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Global Office Listings
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Bentley Substation At-A-Glance

General/System Features

- Standalone product – no additional CAD software required
- Command protection
- One-click navigation
- Search tool
- Fully open API
- Bentley SELECT® licensing
- Project-wide data editor
- i-model support
- Import legacy DGN files into active project
- Can operate in Citrix environment (XenApp 5.0 or 6.0)
- Supports Bentley Descartes software for integrating point cloud data of existing designs and editing existing 2D raster drawings

3D Modeling Features

- Intelligent objects linked to parts database
- Hook points automatically align and join related objects
- Grounding grid layout tool
- Wire sag algorithm (spline and catenary, hook-point enabled)
- Lightning protection (rolling sphere method)
- Dynamic views – 2D and 3D views both update dynamically when either is edited
- Dynamic section views

Electrical Drawing/ Design Features

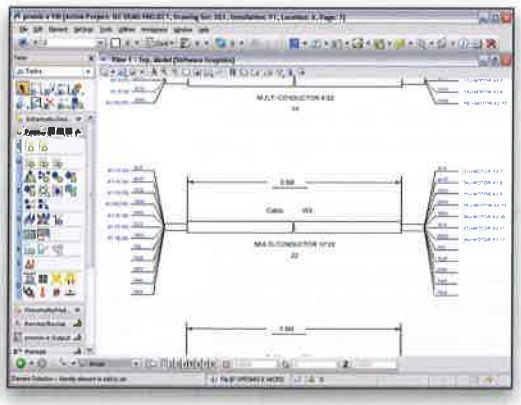
- Project-based design organization
- ANSI/IEEE or IEC electrical symbol catalog included
- Ladder builder
- Wire sizing tool (NEC, 600V max.)
- Manufacturers parts databases and symbol catalogs
- Global find/replace wire property
- User-definable device tag formats
- User-definable wire layering
- User-definable wire tag formats
- Cable termination diagrams
- Automated balloon callouts
- Panel layout mode
- BOM explorer
- Dynamic symbol text
- Automatic component align
- Global find/replace symbols & symbol properties
- Automatic wire numbering
- Automatic page numbering
- Automatic page save
- Automatic project copy
- Page copy, rename, move
- Global title block replace
- Automatic device tagging
- Custom symbol creation
- User-definable circuit macros & symbols
- Symbol migration tool
- AutoCAD block migration tool
- Intelligent off-page wire references
- Automatic wire/line break & heal
- Automated circuit copy
- Wire crossing/ connection preferences
- User-definable wire property display
- Catalog manager
- Cable manager
- Cable export to Bentley Raceway and Cable Managment
- PLC schematic generator
- Automatic PLC addressing
- PLC I/O import
- Automated symbol rotation
- Real time cross-referencing across multiple pages
- Multi-user/discipline collaboration
- Multiple undo/redo capabilities
- Instantaneous real time error checking
- Forced wire routing
- Dynamic wire diagrams
- Terminal/pin-plug manager
- Graphical terminal/pin-plug plans
- Spare parts utility
- Multi-language drawing text
- Drawing mode manager
- Shortest distance wire routing

Reports and Documentation

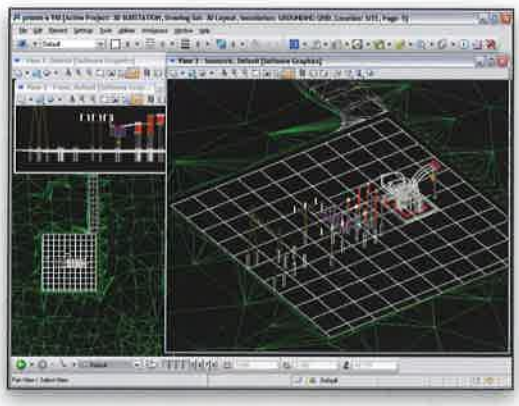
- Automatic report generation
- Bill of materials
- Wire list
- Wire labels
- Wire length calculation reports
- Cable list
- Terminal-plug list
- PLC list
- Job costing report
- Field wire list
- Revision history reports
- Custom report designer
- Output reports to TXT, CSV, HTML, RTF, PDF, XLS, MHT files
- Project publisher

Special Utilities

- Project builder
- Panduit selection tool



Cable diagrams – display connection information automatically.



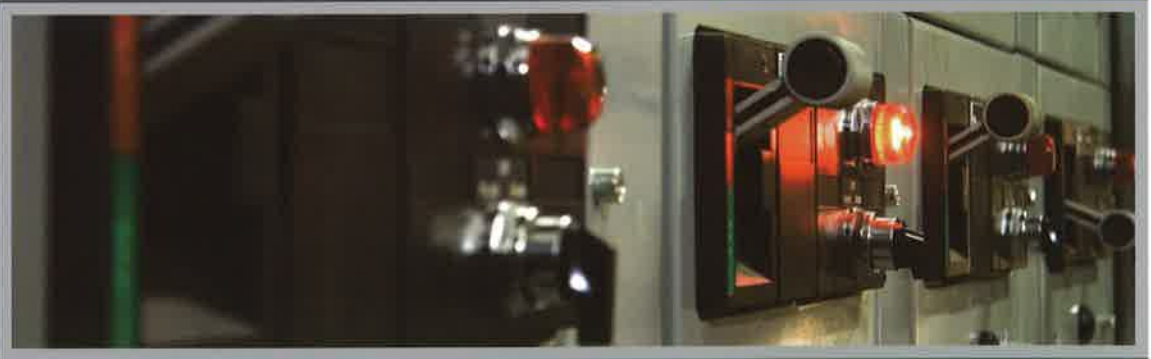
Grounding grid layout function – configure the grid as part of the 3D model.

Bentley
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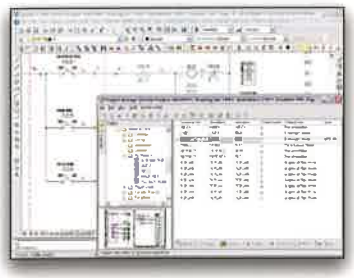
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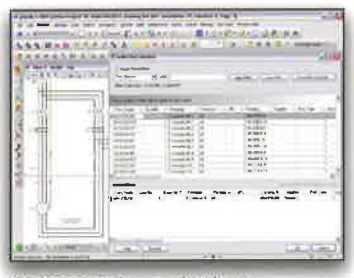
promis•e® V8*i* (SELECTseries 7)

A Comprehensive Set of Electrical Control System Design Tools

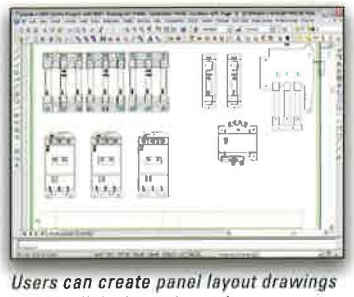
promis•e is the world's leading control system design software for difficult tasks that involve electrical schematics, connection lists, panel layouts, bills of material, and more. promis•e integrates all these functions for quick, accurate, and efficient results.



A project-based workflow organizes and interconnects the design.



An integrated parts database incorporates engineering data.



Users can create panel layout drawings that are linked to schematics.

Project-based Workflow Supports Intelligent Designs

promis•e V8*i* (SELECTseries 7) organizes work into projects, linking drawing pages for cross referencing, error checking, and list generation. Changes made to one part of the project are automatically reflected in the rest of the project.

Schematic Design Tools Save Time

With built-in symbol libraries, macros, and cut-and-paste capabilities, promis•e provides quick generation of control system schematics. System logic also provides automatic device ID assignment, real-time automatic cross referencing, automatic wire numbering, and error checking. Users can also automatically generate schematics from commands stored in a spreadsheet file. Truly an international product, promis•e comes equipped with standard IEC and ANSI-IEEE page formats. Symbol libraries are available for ANSI and IEC electrical applications as well as for hydraulic, pneumatic, and process control drawings.

Error Checking Improves Design Quality

As drawings are created, promis•e alerts the user to possible errors, which reduces the amount of manual checking, improves the overall accuracy of the drawing, and prevents costly corrections. Error conditions include short circuits, gaps in the circuit, duplicate device IDs, duplicate wire numbers, missing part numbers, missing cross references, and over-assigned contacts (for example, five contacts for a four pole relay).

Parts Database Integrates Engineering Data

promis•e includes a parts database that allows users to associate components in the design with specific parts information. It also facilitates the generation of parts lists, panel layouts, and other documents. Parts database files are available for many leading equipment manufacturers, which saves project team members from having to manually enter data. Users can also import existing parts data, including parts data and attributes from AutoPLANT® software.

Fast and Accurate Report Generation

A parts database linked to the schematic provides superior documentation. This enables bills of material, purchase order lists, panel layouts, terminal plans, wire lists, and wiring diagrams to be generated automatically, based on drawings and other system information. This process decreases the number of errors, and quickly reflects all design revisions in the reports.

Data Exchange and Distributed Engineering Maximizes Collaboration

With promis•e, users can exchange project data with other applications such as AutoPLANT, Bentley Instrumentation and Wiring, Bentley Data Manager, Bentley Raceway and Cable Management, and PLC programming software. The promis•e software is compatible with ProjectWise®, which provides robust, enterprise-level engineering content management and team collaboration capabilities to support the control design workflow.

Wire Sizing Saves Materials and Energy Costs

The V8*i* (SELECTseries 7) release of promis•e includes the ability to analyze and set wire sizes for each run. By planning for appropriate sizing early, designers can provide the facility with lower CAPEX through optimal wiring purchases and control OPEX through lower utility costs. With promis•e, electrical design theory and practice meet to help engineers support operations.

System Requirements

Operating System:
Windows XP Professional (SP2 or later), Windows 7 (32 or 64 bit versions)

CAD Software:
For stand-alone version – no additional CAD software required (MicroStation CAD engine is built in)

Database Software:
SQL Servers: SQL Server 2005, SQL Express 2005, and SQL Server 2008 (an express version of SQL Server is included);

Oracle Servers: 10g and 11g; Oracle Clients: 11g

Processor:
Intel® or AMD® processor 3.0 GHz or greater

Memory:
2 GB recommended

Hard Disk:
650 MB free space

Video:
Graphics card supported by DirectX 9.0c

Find out about Bentley at: www.bentley.com

Contact Bentley
1-800-BENTLEY (1-800-236-8539)
Outside the US +1 610-458-5000

Global Office Listings
www.bentley.com/contact

promis•e At-A-Glance

General/System Features

- Online tutorial
- Available in English, Chinese, German, Russian
- Command protection
- One-click navigation
- Search tool
- Fully open API
- Floating network license
- Project-wide data edit
- Integrates with ProjectWise for content management and distributed engineering
- Can operate in Citrix environment (XenApp 5.0 or 6.0)

Drawing/Design Features

- Project-based design organization
- ANSI/IEEE or IEC electrical symbol catalog included
- Optional catalogs: hydraulic, pneumatic, and ISA
- Manufacturers parts databases and symbol catalog
- Import parts data and attributes from AutoPLANT
- Ladder builder
- Global find/replace wire property
- User-definable device tag formats
- User-definable wire layering
- User-definable wire tag formats
- Cable termination diagrams
- Automated balloon callouts
- Panel layout mode
- BOM explorer
- Dynamic symbol text
- Global find/replace symbols and symbol properties
- Wire sizing tool
- Automatic component alignment
- Automatic wire numbering
- No page limits
- Automatic page numbering
- Automatic page save
- Automatic project copy
- Page copy, rename, move
- Global title block replace
- Automatic device tagging
- Custom symbol creation
- User-definable circuit macros and symbols
- Symbol migration tool
- AutoCAD block migration tool
- Intelligent off-page wire references
- Automatic wire/line break and heal
- Automated circuit copy
- Wire crossing/connection preferences
- User-definable wire property display
- Catalog manager
- Cable manager
- PLC schematic generator
- Automatic PLC addressing
- PLC I/O import
- Automated symbol rotation
- Real-time cross-referencing across multiple pages
- Multi-user/discipline collaboration
- Multiple undo/redo capabilities
- Instantaneous real-time error checking
- Forced wire routing
- Dynamic wire diagrams
- Terminal/pin-plug manager
- Cable export to Bentley Raceway and Cable Management
- Graphical terminal/pin-plug plans
- Spare parts utility
- Multi-language drawing text
- Drawing mode manager
- Automatic wire routing
- Equipment numbers (generic part numbers)
- Export graphics and data through i-models

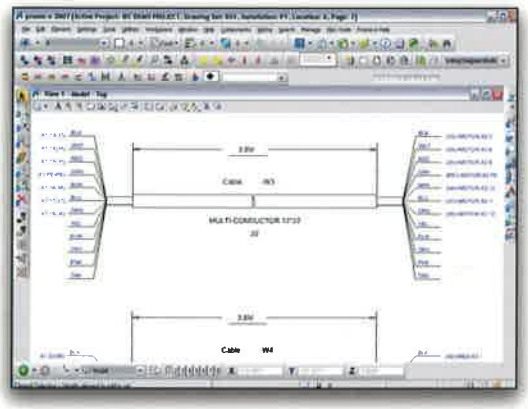
Reports and Documentation

- Automatic report generation
- Bills of material
- Wire list
- Wire labels
- Wire length calculation reports
- Cable list
- Terminal-plug list
- PLC list
- Job costing report
- Field wire list
- Revision history reports
- Custom report designer
- Output reports to TXT, CSV, HTML, RTF, PDF, XLS, MHT files

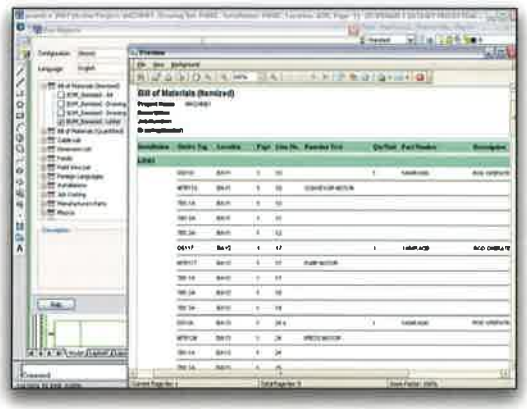
Special Utilities

- Project builder
- Komax wire wizard
- Panduit selection tool

* promis•e is offered in levels with different combinations of these functions. For additional information, visit www.bentley.com/promise.



The cable diagrams in promis•e display up-to-date connection information.



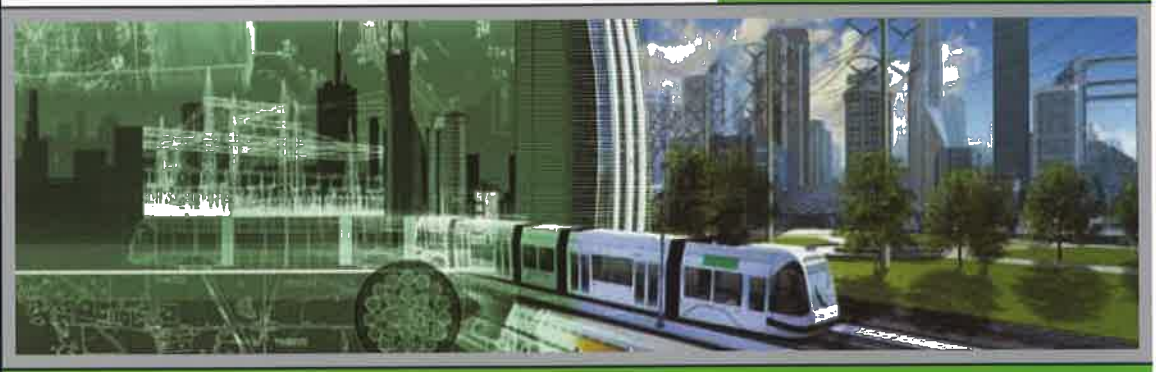
Users can automatically generate bills of material and other reports.

Bentley
Sustaining Infrastructure

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PRODUCT DATA SHEET

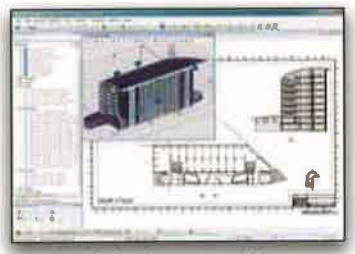
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MicroStation® V8*i*

A Software Foundation for Infrastructure Design

MicroStation V8*i* is used by engineers, architects, GIS professionals, constructors, and owner operators to design, model, visualize, document, map, and sustain infrastructure projects. MicroStation V8*i* is their preferred software foundation because it delivers an integrated and proven set of intuitive, interactive, and highly interoperable capabilities to the desktop.



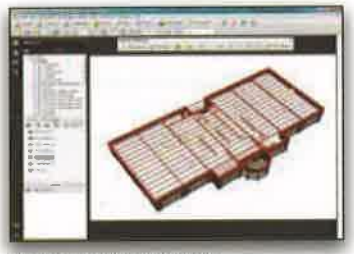
Simplify 2D drawing composition



Geo-Coordinate project information



Visualizing project designs



Produce intelligent 3D PDFs

Interoperability Support

MicroStation V8*i* provides project teams with a single software product which delivers significant interoperability advantages. MicroStation V8*i* enables users to overcome many DWG reuse challenges and extend the value of DWG data by integrating all DWG and DGN content in one place. Users can aggregate and reuse 3D models from multiple software products, and work much faster with large raster files to speed project completion.

Intrinsic Geo-Coordination

MicroStation V8*i*'s new geo-coordination capabilities enable project teams to accurately and quickly coordinate project information from multiple sources, stored in multiple file formats, using multiple coordinate and grid systems. Using MicroStation V8*i* geo-coordination tools, project teams can easily and accurately attach vector and raster reference data inside the same file. MicroStation V8*i* includes OGC Web Map Server support and concurrently integrates real-time GPS information inside the same MicroStation design environment.

Interactive Dynamic Views

MicroStation V8*i*'s dynamic views help project teams simplify 2D drawing composition and enhance 3D modeling and visualization experiences. With dynamic views users can slice and filter models to see only what is needed and maintain a fully coordinated set of 3D models and 2D deliverables across projects. Because the views in MicroStation V8*i* are "dynamic," they are all updated immediately when the model is changed. Dynamic Views are optimized for both centralized and distributed teams to interactively compose 2D drawing sheets from plans, sections, and elevations.

Integrated Print Organizer

MicroStation V8*i*, with print organizer, enables teams to enforce corporate CAD standards when plotting drawings using print styles, to assemble hybrid plot sets that consist of DGN, DWG, raster and other vector files in 2D and 3D formats, to produce identical paper and PDF copies of drawings with the push of a button, and to eliminate time-consuming and expensive manual processes through plot automation and batch printing.

Intuitive Design Modeling

MicroStation V8*i*'s intuitive design modeling tools satisfy project teams' 3D modeling requirements with a single software product. Using MicroStation V8*i*, teams can intuitively and interactively build and edit models faster. They can also aggregate and assemble geometry from multiple software sources to save time and money, and – using GenerativeComponents® inside MicroStation – can now create smarter geometry to explore more design options in less time.

"Saving time and working faster are really what it is all about."

– Wm Saunders Partnership LLP | WSP

Iterative Luxology Rendering

MicroStation V8*i*'s near-real-time photorealistic Luxology rendering enables project teams to gain project stakeholder buy-in, validate the fit and finish of a project, and secure funding for design alternatives.

MicroStation V8*i* can – at the push of a button – produce the very highest quality images using preconfigured settings to better balance speed and quality. Project teams can now deliver incredibly realistic interior and exterior views using lighting and textures that mirror project reality like never before.

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SYSTEM REQUIREMENTS

Processor:
Intel Pentium or AMD Athlon

Operating System:
Windows 7, Windows 7 x64, Windows Vista, Windows Vista x64, Windows XP Professional (SP2 or later), Windows XP Professional x64, Windows XP Home Edition (SP2 or later), Windows XP Tablet PC Edition, Windows Server 2003 (SP1 or later), Windows Server 2003 x64

RAM:
512MB memory minimum, 2GB recommended

Hard Disk:
900MB free disk space minimum

Find out about Bentley at: www.bentley.com

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Global Office Listings
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Compatible with Windows 7

CITRIX ready

MicroStation V8*i* At-A-Glance

Design Productivity
- Group tools and tasks with customizable interface
- Employ a comprehensive set of drafting and detailing tools
- Use AccuDraw® for dynamic input with heads-up display
- Speed production with intelligent and interactive snapping
- Reduce keystrokes with Keyboard Position Mapping
- Create customizable cursor menus
- Navigate through file history
- Batch convert multiple formats

Interoperability Support
- Trusted DWG support with Autodesk RealDWG
- Object enabler support
- Ability to aggregate and assemble multiple file formats including: DWG, DXF, PDF, U3D, 3DS, IGES, Parasolid, ACIS SAT, CGM, STEP AP203/AP214, Collada, Rhino 3DM, VRML World, Google Earth KML, SketchUp SKP, ESRI SHP, STL, OBJ Files
- Ability to view and manipulate point cloud data

System Administration
- Microsoft MSI installers dtreamline deployment
- Pooled licensing via SELECTserver

3D Design Modeling
- Build and edit solid, surface, mesh, and feature models
- Intuitively push, pull, drag, cut, & extrude 3D geometry
- Create 3D print-ready models
- Model geometry, capture relationships, and create forms parametrically using GenerativeComponents
- Use models from Google 3D Warehouse and many other sources
- Detect and resolve clashes*
- Simulate schedules dynamically (supports Microsoft Project and Oracle's Primavera)**

Geo-Coordination
- Support for 100s of geospatial coordinate systems
- Geospatial Referencing using multiple coordinate systems
- Simple AEC coordinate transformation for buildings
- OGC Web Map Server support
- Geospatial PDFs referencing
- Google Earth integrations
- Real-time GPS device support

Photorealistic Rendering
- Near-real-time Luxology rendering
- Point-and-shoot physically correct materials and lighting libraries
- Multi-core support for 32 -bit processors
- Rich online photorealistic content (RPC)
- Distributed/networked rendering

Powerful Animation
- Keyframe & time-based animation
- Live on-screen animation preview
- Luxology–powered for speed and realism
- Timeline and velocity graph
- Distributed/networked processing

Printing and Plotting
- Create, manage, and navigate plot sets with print organizer
- Control print settings using print styles
- Batch print multiple drawings
- Publish intelligent 2D/3D PDFs using genuine Adobe PDF tools

CAD Standards Management
- Use DGN libraries to manage all styles for dimensions, text, lines, detail symbols and display
- Control drawing composition content and workflow
- Integrate CAD standards using element templates
- Manage CAD standards with configurable checking tools
- Leverage Citrix XenApp certification for product installation support

Dynamic Views
- Coordinate 3D models & 2D drawings automatically
- Drag and drop plans, elevations and sections to create documentation
- Slice & filter 3D models to improve interactive visualization
- Update drawings automatically when models change
- Update all annotation dynamically

References
- Reference 2D/3D DGN, DWG and large image files
- Attach versioned files using design history
- Attach PDF files as a reference

Large Image File Support
- Supports 50+ image file formats
- Support for multi-page PDFs
- Support for multiple wavelet compression formats

Design Review
- Review and mark up designs with redline comments
- Manage markups and review workflows with markup dashboard
- Publish i-models for design review workflows

Change Management
- Record all changes with design history to enable revision control
- Roll back design file changes from any work session
- Compare and plot design file changes

Project Coordination
- Dynamically update all annotation
- Create link sets to manage references to Microsoft Office documents
- Navigate from content in one file or model to others using hyperlinks
- Publish intelligent PDFs that retain all hyperlink intelligence

Digital Security
- Confirm file status and approvals using digital signatures with 2048-bit public/private keys
- Control digital rights to view, edit, print and copy file content
- Pre-define expiration dates for design files

Workgroup Collaboration
- ProjectWise® integration for reference file and workspace management, and title block integration
- Integrated design file versioning
- Microsoft SharePoint integration

Application Extensibility
- Customizable user interface
- User-defined macros
- Support for Microsoft (VBA) .NET, C++, C#, and Bentley MDL
- Universal database connection

Graphics Performance
- DirectX graphics technology
- Display style system
- PANTONE, RAL, & NCS color books
- Element transparency, display priority, and gradient fills

iWare for MicroStation
- Bentley DGN IFilter indexes content of DGNs for fast searching in Windows
- Bentley DGN Thumbnail Provider generates thumbnails in Windows Explorer

* Requires ProjectWise Clash Resolution Visa license

** Requires ProjectWise Schedule Simulation Visa license

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Bentley's promis•e Streamlines Design of Two Mining Projects in Australia

Software Enables LE80JV to Automatically Generate Schematics, Connection Diagrams, and Cable Schedules

Project Summary

Organization:
LE80JV

Solution:
Mining and Metals

Location:
State of Victoria, Australia

Project Objective:
Streamline the design phase of two mining projects in Australia using an intelligent design drawing package rather than traditional CAD drafting methods

Products Used:
- promis•e®
- MicroStation®

Fast Facts

- With past experience using Bentley products, LE80JV evaluated and selected Bentley's promis•e electrical design software for the project
- The software's application programming interface enabled the project team to automatically generate schematics, connection diagrams, and cable schedules on the first project
- Bentley's training and technical support was instrumental in getting the project smoothly off the ground
- By leveraging the design content and software used for the Murray Basin project, LE80JV generated a control-system design for the second project, the Jacinth Ambrosia mine, in weeks rather than months

Over time, skilled professionals develop effective methods for designing infrastructure and often are reluctant to deviate from those tried-and-true practices. Yet the more daring among them understand that experimentation often leads to breakthroughs.

A case in point is LE80JV, the joint venture of LogiCamms and Electro80 that specializes in implementing large electrical and control system engineering projects. When LE80JV was hired to work on a pair of large projects for the mining company Iluka Resources, it saw a chance to do things differently. The project involved mineral sands mining and processing in the Australian state of Victoria, with zircon being the end product. According to LogiCamms Vice President Garry McGrechan, "At the beginning of the project, a decision had to be made whether to use traditional CAD drafting methods to produce the electrical and instrumentation drawings or to use an intelligent design drawing package."

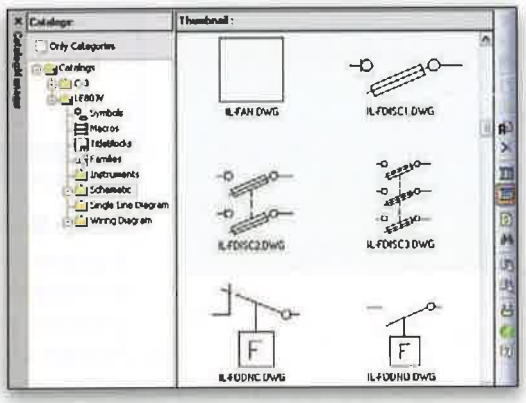
The decision was made to go with an intelligent design drawing package in order to streamline the design phase and help meet the first project's 18-month schedule. Having previous experience with software products from Bentley Systems, LE80JV evaluated and selected Bentley's promis•e electrical design software for the project.

Using the application programming interface (API) available in promis•e, the LE80JV team was able to automatically generate schematics, connection diagrams, and cable schedules for Murray Basin, the first of the two mining projects. The API allowed the team to change the design and check the results easily. It also allowed LE80JV to leverage the control system design and automatically generate 100 percent of the drawings for the second project, the Jacinth Ambrosia mine in Western Australia.

The promis•e software performed many functions automatically including ID assignment, wire numbering, cross referencing, error checking, and report generation. The software's intelligence speeds the design process by eliminating tedious manual "bookkeeping" work. It also prevents mistakes that occur through human error, such as duplicate IDs and wire numbers, missing or incorrect part numbers, and so on.

Two additional advantages were the software's flexibility to run either as an add-on to MicroStation or AutoCAD, and its ability to produce drawings in DWG – the format Iluka prefers. In addition, promis•e offered the option of automatically generating drawings from templates, which was a major part of the plan to maximize efficiency in the design phase.

As a preliminary step, LE80JV created an electrical and instrumentation symbol library for Iluka. Although an electrical symbol library is provided with the software, Iluka had many custom symbols that were needed to meet its design standards.



Custom symbol library

Training and Technical Support

Another key preliminary step was training. Fifty percent of the design team (about ten people) received promis•e training, including electrical engineers, instrumentation engineers, and draftspersons. The training also included engineers from Iluka, which gave the client confidence in the system as well as the design process. In short, Bentley's training and technical support was instrumental in getting the project smoothly off the ground.

The next step was to create the page templates and drawing macros that make the automated generation of drawings possible. The page templates followed Iluka's standards for page size and title blocks. The drawing macros consisted of schematic sections for various drive types including direct-on-line (DOL) starters, variable speed drives, soft starters, as well as other common drawing elements. Each drive type included power schematics, control schematics, and interconnection diagrams.

It was then necessary to create the data files for the promis•e Project API Builder. Although promis•e allows drawings to

"As an engineering tool, promis•e certainly fulfilled our expectations of simple mass production of electrical and instrument drawings. It saved us valuable time on both projects, and its ability to produce files in DWG enabled us to meet our client's format requirement."

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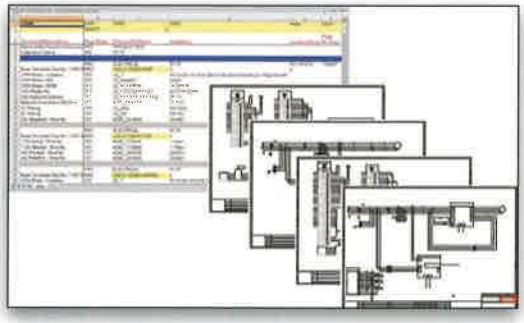
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be drafted manually, the API Builder is an optional, custom programming interface that allows automated drawing generation by accessing commands and parameters stored in Microsoft Excel.



Templates for electrical, power, and interconnection diagrams

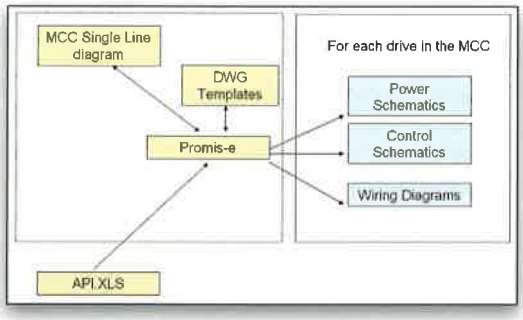
A typical Excel spreadsheet contains sections dedicated to power, control, and interconnection drawings. Each section includes commands for creating a page and placing the necessary macros. Additional parameters include such data as part numbers, power ratings, and circuit breaker size. This approach has the advantage of allowing design changes to be made by editing a single spreadsheet file rather than numerous drawing files.



Drawings generated from an Excel file

Design Methodology in Action

To generate the drawings, the user utilizes the API generator in the promis•e software to follow the commands in the spreadsheet, combining the templates and macros as needed. The output is in DWG drawing files.



Process for automated drawing generation

LE80JV used a similar method to create the instrument drawings. First, an instrument list was compiled for the project. Then templates and macros were created for all the instrument types (flow meters, density gauges, etc.). The data from the instrument list and templates was then combined with the API spreadsheet files via a custom program written by LE80JV. LE80JV then used promis•e, working through the API Builder, to generate the instrument drawings.

The team also used promis•e for report generation. The software automatically generated drawing reports, project revision summaries, cable schedules, and bills of material. promis•e includes a parts database containing detailed component information about all the devices used in the drawings. This data is included in the reports.

LE80JV applied this design methodology to complete the Murray Basin mine in 12 months – six months ahead of schedule.

As this project was coming on line, the Jacinth Ambrosia mining project was just beginning. By leveraging the design content and software used for the Murray Basin project, LE80JV generated a control-system design for this project in weeks rather than months.

On both projects, promis•e produced the following drawings (more than 2,000 drawings total):

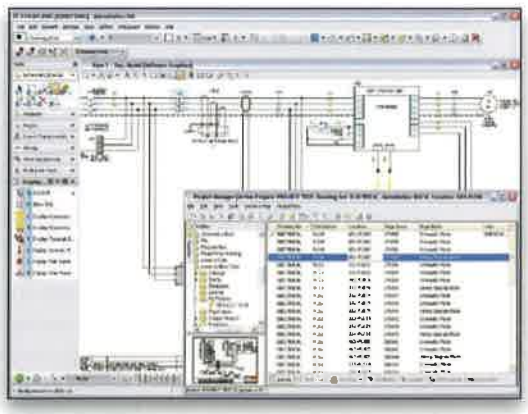
- Single line drawings
- Power and control schematics
- Interconnection diagrams
- Cable schedules
- Instrumentation loop and power drawings

Results Achieved

Using promis•e rather than traditional CAD drafting methods, LE80JV made major efficiency gains, including:

- Reducing engineering and drafting hours by 25 percent
- Regenerating a large number of drawings in response to design changes quickly
- Enabling the client to check only template files and API spreadsheet files, minimizing the time needed for its input
- Reducing drawing checking time by 70 percent
- Reducing upfront engineering time by 50 percent on the Jacinth Ambrosia project
- Greatly reducing the chance of human error on both projects as a result of automated drawing generation

McGrechan said, "As an engineering tool, promis•e certainly fulfilled our expectations of simple mass production of electrical and instrument drawings. It saved us valuable time on both projects, and its ability to produce files in DWG enabled us to meet our client's format requirement."



More than 2,000 control and instrumentation drawings were generated.

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ProjectWise® Secures Information Mobility with Integrity

What is ProjectWise?

A system of collaboration servers and services for AECO information for the design and construction of infrastructure projects while the work is in progress – providing work-sharing, content re-use, and dynamic feedback capabilities.

Organizational Agility in a Managed Environment: Create and manage ongoing work-product effectively – where the right people quickly and reliably accelerate work-in-progress using infrastructure tools and workflows of choice.

Maximized Value Across the Enterprise: Inform project stakeholders and enterprise systems in a more consistent, timely and predicable manner using high-impact deliverables.

Timely and Actionable Participation: Synchronize comments to resolve issues quickly and effectively in a 'closed-loop', returning feedback in context to all the relevant designers so as to be actionable.

Market Facts

Enterprise Scale:

- ProjectWise enterprises range from tens of users to hundreds of thousands
- Representative ProjectWise accounts average over 1000 users
- Representative ProjectWise user organizations manage over 400,000 documents averaging 7.5 MB each

System of Choice:

- Half of the U.S. state departments of transportation
- 24 of the *ENR* Top 25, 42 of the *ENR* Top 50, and 72 of the *ENR* Top 100 Design Firms
- 29 of the *ENR* Top 50 Design-Build Firms
- 234 of the *Bentley Infrastructure 500* Top Owners



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Proven, Reliable, Broad Industry Adoption

ProjectWise is used in 92 countries by many of the world's leading infrastructure organizations. A sampling appears below.

Integrated Projects Demand Information Mobility Across:

- **Collaboration** – to virtualize talent
- **Context** – to increase content usability
- **Continuity** – so that handoff and handover become "hands-on"

i-models deliver AECO information mobility, ProjectWise secures information mobility, the combination of both ensures "information mobility with integrity".

Work-Sharing Services

Empower and manage engineering content and team collaboration	ProjectWise Integration Server
Solve the geographically distributed 'big files' problem	ProjectWise Caching Server
Provide passport-enabled project team member access via a web browser	ProjectWise Web Server
Package, register, deliver and track AECO submittals and transmittals	Bentley Transmittal Services
Follow a best practice for AEC project management from the UK	ProjectWise Business Process Template (for BS1192)

Content Reuse Services

Automate production plotting for paper, PDF, and 3D plots	ProjectWise InterPlot Server
Automate i-models, PDFs, and raster production	ProjectWise Dynamic Composition Server
Define and enforce explicit dependency relationships	ProjectWise Dependency Service
Enable read-only browser access to broader stakeholders (no passport required)	ProjectWise Web View Server
Enterprise access to spatial data stored in ArcGIS	ProjectWise Connector for ArcGIS
Enterprise access to spatial data stored in Oracle databases	ProjectWise Connector for Oracle Spatial

Actionable Feedback Services

Review, mark-up, clash resolution, and visualization of i-models	Bentley Navigator
Produce paper plots for dynamic review with digital pens	ProjectWise Dynamic Plot Service
Access PDS models and data without requiring PDS software	ProjectWise PDx Dynamic Review Service

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