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."

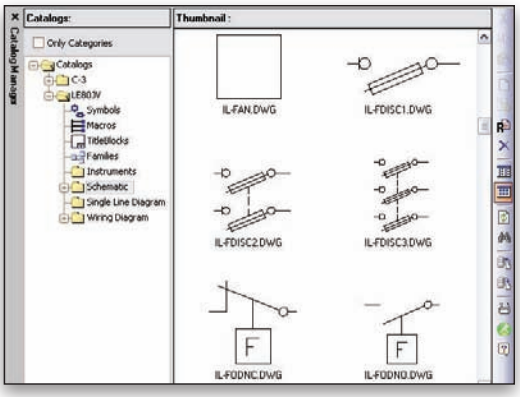
The decision was made to go with an intelligent design drawing package in order to streamline the design phase and help meet the first project's 18-month schedule. Having previous experience with software products from Bentley Systems, LE80JV evaluated and selected Bentley's promis•e electrical design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

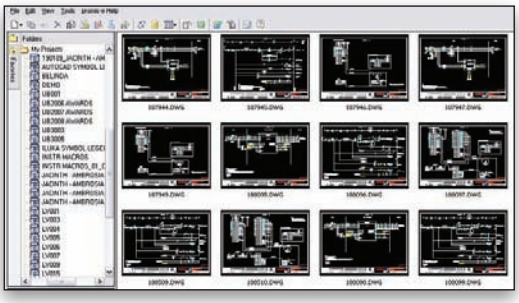
"As an engineering tool, promis•e certainly fulfilled our expectations of simple mass production of electrical and instrument drawings. It saved us valuable time on both projects, and its ability to produce files in DWG enabled us to meet our client's format requirement."

Find out about Bentley at: www.bentley.com

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

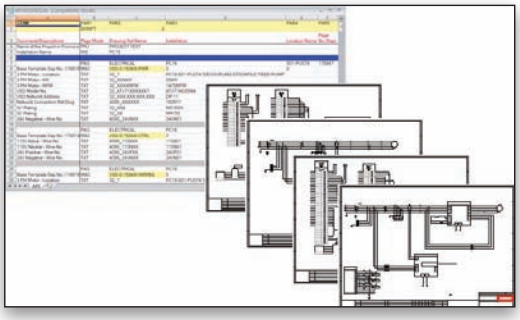
Global Office Listings
www.bentley.com/contact

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

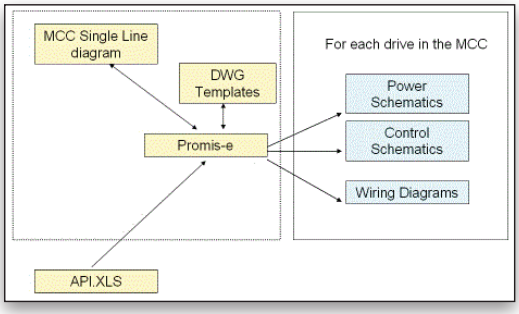
A typical Excel spreadsheet contains sections dedicated to power, control, and interconnection drawings. Each section includes commands for creating a page and placing the necessary macros. Additional parameters include such data as part numbers, power ratings, and circuit breaker size. This approach 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):

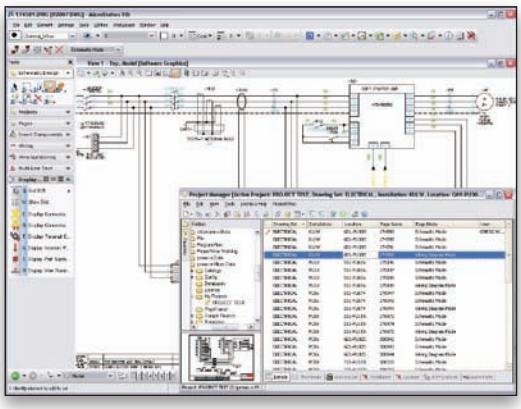
- Single line drawings
- Power and control schematics
- Interconnection diagrams
- Cable schedules
- Instrumentation loop and power drawings

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.

Bentley Sustaining Infrastructure