

## Powerlink Achieving Higher Efficiencies and Safety With CAD Standards

May 2006

*CADconform streamlines the drafting process, improves workflow and drawing quality from sub-contractors, and increases CAD data integrity enabling move to intelligent systems and contributing to safety*

Most of us never have to really think about electricity. We just put the plug in the wall and we're ready to go. Not so for Powerlink Queensland, the largest high-voltage electricity transmission service provider in Australia. The very core of its business is ensuring the secure, reliable transmission of electricity so that the rest of us can just count on it being there when we need it. (See "Overview of Powerlink" sidebar on page 2.)

To be successful, Powerlink must operate safely and reliably, but it must also be efficient and cost-effective. As a recognized world leader in the operation and maintenance of high-voltage electricity transmission services, many factors contribute to its success. Among them is CADconform.

Powerlink began using CADconform in 2004. Not long before, the company recognized that increased economic development, and the resulting job mobility and drafter turnover, were adversely affecting the data quality of its 300,000 CAD drawings—drawings and data which are crucial to the full lifecycle design, construction, operation and maintenance of its transmission network.

Those CAD data quality issues were costing the company in less efficient use of time and resources, with the



CADconform is the enabling technology that lets Powerlink conform CAD drawings 100 percent to its CAD standards, providing the data accuracy needed for use of real-time drawing viewers, contributing to the overall safety of its operations.

### Case Study – Quick Look

#### CADconform at Powerlink Queensland

- ▲ Zero to standards in 5 days
- ▲ Improves high-voltage operational safety
- ▲ Reduces administration effort
- ▲ Mitigates data quality issues of employee turnover
- ▲ Verifies sub-contractors' work within the contractual timeframe

potential to cost even more in potential power outages or worse yet, potential for property damage or personal injury. Powerlink also recognized that the goal was not enough to simply maintain the drawings; it had to find new ways to leverage its corporate data to continually improve operational efficiency and safety. (See "Significant Contributions to HSE" sidebar page 3.)

Using CADconform, Powerlink has been able to:

- ▲ Establish a fully-operational complete system for CAD standards in just 5 days.
- ▲ Manage that complete CAD standards system centrally to provide the security needed to maintain standards with the flexibility and ease to update it across its network of users.
- ▲ Provide easy-to-use tools for drafting, checking and correcting drawings to help mitigate issues arising from drafter turnover.
- ▲ Implement a process to check CAD drawings from contractors (sometimes more than 1,000 per week) within contract-specified time periods.
- ▲ Restore the quality of its 300,000 CAD drawings and put a process in place to ensure that data integrity going forward.
- ▲ Use its standards-conformed CAD data: in a 24/7 real-time viewing system, to make significant steps towards the company's goal of intelligent design and drafting systems, and to contribute to the overall safety of its operations.

Design Office Coordinator Tim Steer was a key member of the Powerlink team that evaluated CAD standards solutions and ultimately selected CADconform.

Steer is responsible for the company's CAD standards and drafting environment and has been with Powerlink for

*continued on page 2*

more than 10 years. He started his career as a tracer and progressed quickly up through drafting roles and into CAD systems administration. He has rich experience with an understanding of drafting, the tools

## Overview of Powerlink

Powerlink Queensland of Australia is a recognized world leader in the operation and maintenance of high-voltage electricity transmission services. The company develops and operates the high-voltage electricity transmission network for the state of Queensland (see the map on page 3). Powerlink is headquartered in Brisbane, with service providers in regional centers around the state.

With a population of over 4 million people, Queensland is Australia's second largest state, occupying about 25% of Australia's land mass, a bit more than twice the size of the state of Texas in the US. Powerlink's \$2.2-billion (USD) transmission network (which consists of 1700 km of high-voltage transmission lines, 147 transformers and 98 substations) transports electricity from generators to electricity distribution networks, for use by individual consumers and businesses, and directly to large industrial customers.

Powerlink was one of 25 international transmission utilities to participate in the International Transmission Operations and Maintenance Study (ITOMS) 2003, a benchmarking study in which the performance of participants was measured across cost and service levels against established criteria. That study showed that Powerlink performed strongly in: asset and risk management, the general management of the network, and cost effectiveness. (ITOMS results for 2006 are currently being collated.)

## Powerlink Projects and Drafting Operations

Powerlink's projects consist of adding new power lines, transformers, substations, circuit breakers, capacitor banks, shunt reactors, static var compensators and the maintenance of existing facilities to ensure the safe, secure and reliable transport of high-voltage power.

Currently, it has more than 300,000 CAD drawings in its system. Depending on the size and type of a project (for example, additional transmission lines versus a new substation) a project may involve 50 to 3,000 drawings at a time. (At the time of this writing, the Powerlink website lists more than 20 major active projects, with hundreds of smaller operational projects also being worked on and completed.)

Powerlink has a team of over 40 in-house drafters covering all engineering disciplines. The company also contracts with outside companies with an additional 30 to 40 drafters.

The primary business driver for Powerlink is the strong economic development and growth in Queensland, and the need to maintain and develop the electricity transmission infrastructure in support of that growth.

For more information, visit the Powerlink website at [www.powerlink.com.au](http://www.powerlink.com.au).

drafters need for success, the drafting workflow and its implications for an overall project, and the requirements for a complete system for CAD standards management.

## Life Before CADconform

Steer explains that in the "old days," all drafting staff were internal, drafters were brought up through the company, remained at job positions for a long time, and had all the history and background knowledge to do a thorough and consistent job. But today's high-growth economy results in job mobility, so drafters move frequently and can't develop that same solid skill set and knowledge of an organization as in the past.

As a result of this change, the quality of the CAD drawings suffered, which showed up in the drawings as incorrect line styles and colors, wrong cells on wrong levels, and dropped cells. This meant drawings were difficult to read, could not be used as templates, and in that state, there was no ability to use the CAD drawings in intelligent systems or for other advanced business applications.

The drafting group had a printed CAD standards manual and had implemented some of those standards using features native to the CAD software. However, Steer explains, "If you needed to update those tools in the CAD system, you had to do it on every drafter's machine. There was no way to do it centrally across the network."

*"... with CADconform we had a complete, fully operational CAD standards system in just 4 days—well 5 days if you count training."*

In addition to its printed standards manuals, there were various electronic sources such as spreadsheets to store standards for the various engineering disciplines. But there were multiple copies of the same sources, no central control, and no way to ensure which was the most current version.

The group had a traditional manual checking process, which involved reviewing a printed copy of a drawing and an associated random review of the features in the CAD file. This checking process was not comprehensive, could not guarantee conformance to standards, and took up to 1 hour per drawing.

Contractors providing drafting services are required to draft to Powerlink CAD standards. The contract requires that when contractors return drawings, Powerlink has a designated time period (usually 1 week) in which to check the drawings for standards compliance and return any non-standardized drawings for correction. If the time period passes, the drawings must simply be accepted as correct.

At the same time resources were becoming harder to acquire, workloads have been doubling and tripling. Some weeks, Powerlink receives 1,000 drawings from outside contractors, on top of the drawings they

work on in-house. One thousand drawings per week with a 1-hour manual check process (which cannot guarantee correctness anyway) would require 25 full-time people per week for checking alone! Faced with trying to maintain quality and no efficient, cost-effective way to check and correct drawings, Powerlink management knew it needed a software-based solution.

## Choosing and Implementing CADconform

"We looked at 4 different software solutions," states Steer. "We knew we needed a solution that provided fast, thorough checking and correction, and a solution that was easy to use. We also wanted one that was easy to install and set up."



*"Since using CADconform, we have achieved a step-change improvement in the quality of drawings each time they are updated."*

"We had narrowed our consideration to 2 possible solutions. One of those solutions required a professional services contract to install and set up, which was a deal-breaker for us. We chose CADconform." Steer goes on to explain, "However, we did choose to take advantage of Altiva Software's professional services for set up and training. As a result, with CADconform we had a complete, fully operational CAD standards system in just 4 days—well 5 days if you count training. That was 4 days to build the standards repository, configure the network, set up all users and then, on day five, we trained them."

To build its standards repository, Powerlink took advantage of CADconform's capability to create standards from any electronic source, starting with one of Powerlink's existing, high-quality drawings. Once CADconform had created standards from that drawing, other Powerlink electronic sources, such as Excel spreadsheets, were also imported into the standards repository.

Now all Powerlink drafters have CADconform and use it for drafting

## Significant Contributions to HSE

Transporting high-voltage electricity is an inherently complex business. Drawings are critical communication tools used in the design, construction, operation and maintenance of the power transmission network. If drawings are wrong, unclear, or illegible, mistakes can be made resulting in facilities or equipment being built or installed incorrectly. CADconform helps eliminate drafting errors that can result in potentially dangerous situations.

Also, if a worker is not using the latest version of a drawing, errors can occur. With Powerlink's real-time drawing viewing system, made possible by standards-conformed data from CADconform, workers now have access to the very latest version of the native CAD file, ensuring use of the latest and greatest information, helping to eliminate errors resulting from using outdated drawings.



Powerlink Queensland operates and maintains the 1700km high-voltage electricity transmission network for all of Queensland, the second largest state in Australia.

and checking their work. CADconform's real-time report feature is used to check the hundreds or thousands of drawings submitted by drafting contractors, in just a few seconds. Now drawings are checked within the contractual timeframe, and those that do not conform can be returned to the contractor for correction. Powerlink is in the process of rolling out CADconform to contractors.

## Benefits of Using CADconform

Since using CADconform, Powerlink has seen some significant benefits for its drafting workflow and overall project management process.

### Improved Productivity and Improved Quality, Especially for New Drafters

CADconform provides the easy-to-use tools that drafters need to draft to standards, check for compliance to standards, and correct any non-compliances quickly and efficiently. In addition, because drafters check their own drawings, several CADconform customers report that drafters can actually eliminate mistakes, learning from the checking and fixing process.

Steer commented that he found the tool very easy to use and was able to quickly figure out how to work with it during the initial evaluation process. But Powerlink had Altiva provide training to the drafting staff to achieve maximum productivity quickly.

"Drawings are living documents used for design, construction, operation and maintenance, the full lifecycle, of our transmission network. So they are updated frequently," remarks Steer. "Before CADconform, we were seeing a decline in quality each time a drawing was updated. Since using CADconform, we have achieved a step-change improvement in the quality of drawings each time they are updated."

continued on back cover

## Save Time, Improve Efficiency for Standards Creation and Maintenance

Powerlink used CADconform's ability to leverage a company's existing sources for initial creation of its CADconform standards repository, which contributed significantly to having a fully operational standards system in just 4 days.

"Standards must be maintained in a controlled environment, with a central point of management to maintain the consistency and integrity or they won't work," affirms Steer. "But standards are also dynamic, and will require updating over time. CADconform makes it easy to update both the standards and related drafting tools across our entire drafting organization, and provides the control needed to ensure standards work correctly and effectively."

## Improved Interoperability with Contractors

With CADconform, Powerlink now has a tool to quickly and accurately check the conformance status of hundreds or thousands of drawings from contractors in just a few seconds. If drawings do not conform, they can be promptly returned to the contractor for correction.



*"Now using CADconform, we've achieved a quality milestone, and we have a process in place to ensure that quality going forward..."*

"Finally having a tool that can check drawings quickly and accurately has added a layer of quality control to our process we didn't previously have," comments Steer. "Once CADconform is rolled out to all of our contractors, we expect even greater efficiencies in the seamless transfer of these drawings."

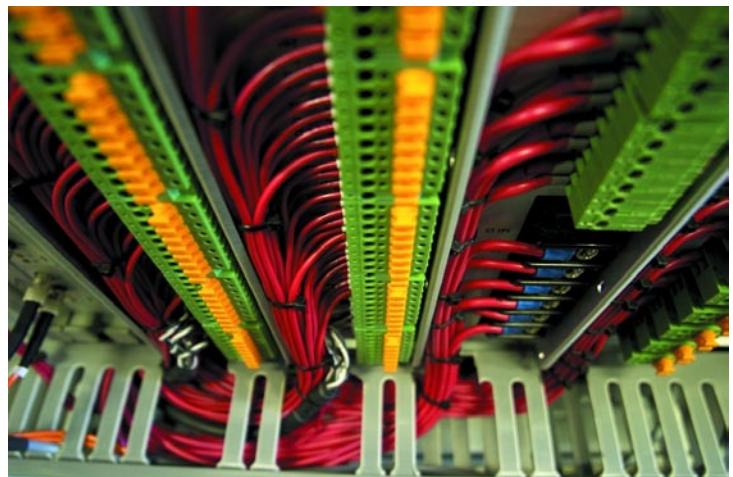
## Strategic Benefits of Data Re-Use

In addition to the workflow benefits of using CADconform, Powerlink has been able to realize some significant strategic benefits from the use of its standards-conformed CAD data.

## Real-time Viewing, Reduce Printing Costs

CADconform has been a key enabling technology to the successful implementation of Powerlink's real-time 24/7 drawing viewing system, which is available from any Powerlink facility all over Queensland. The viewing system provides a way for any worker to view the latest version of the native CAD drawing file, which always presents the worker with the absolute most current version of a drawing and eliminates the time and expenses of printing the drawing.

"But for the viewer to display drawings correctly, the CAD file must be configured correctly. For example, elements must be placed on the correct layers. But there are also certain layers with drafter-only information that must also be turned off for correct viewing," explains Steer. "CADconform ensures that all drawings are configured correctly so they display accurately in our real-time viewing system."



CAD drawings are a critical information source for the ongoing operation and maintenance of Powerlink's extensive network.

## Move to Intelligent Systems

Powerlink has a goal to move to intelligent design and drafting systems within the next few years, and CADconform is helping to make that possible.

Steer explains that there is significant redundancy in Powerlink projects, in some cases 70 to 80 percent overlap. That overlap represents an opportunity to automate and save money.

But every time you draft something new, it opens the possibility for errors, so the entire drawing must be checked to ensure accuracy. Intelligent design and drafting systems are programmed to produce drawings based on specifications. The software that generates the drawing is tested and verified, eliminating the need to check each new drawing produced from the intelligent system.

The issue for any company in moving to these intelligent systems is legacy data. Powerlink has 300,000 existing drawings that eventually must also be imported into an intelligent system.

"Before CADconform, the idea of moving our drawings to an intelligent system was a nice dream, but we weren't going to get there with the level of data quality we had," states Steer. "Now using CADconform, we've achieved a quality milestone, we have a process in place to ensure that quality going forward, and we can take the next step in a move towards implementing intelligent design systems."

[www.altivasoft.com](http://www.altivasoft.com)

Altiva Software – the only company dedicated to CAD standards management

USA/Houston  
Altiva Software Inc.  
14100 Southwest Freeway, # 560  
Sugar Land, Texas 77478  
+ 1 281 295 2250

Germany/Wiesbaden  
Altiva Software c/o Corporate Montage  
Kreuzberger Ring 44a  
65205 Wiesbaden, Deutschland  
+ 46 611 72 39 77 0

Australia/Sydney  
Altiva Software Pty. Ltd.  
Level 3, 80 Arthur St.  
North Sydney, NSW 2060 Australia  
+ 61 2 9957 3733

Australia/Perth  
Altiva Software Pty. Ltd.  
Level 2, Mint House, 326 Hay St.  
Perth, WA 6000 Australia  
+ 61 8 9221 7375