

BHP Billiton Leading the Charge for CAD Standards

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CADconform Case Study

CADconform delivers huge ROIs while solving the CAD standards challenge for major mining company and its sub-contractors

The explosive growth of the economies of China and India at the turn of the millennium caught most of the world completely off guard. For example, the once flat and floundering steel industry of the 1990s has now seen world demand increase by 4 to 5 percent each year since 2000, led by China with double-digit annual percentage growth. Steel, of course, is a critical ingredient for industrialized expansion.

The iron ore industry was also taken by surprise, with iron ore being a critical ingredient for making steel. China, by far the world's largest iron ore importer, has almost quadrupled its import of iron ore, from 70 million tonnes in 2000, to 275 tonnes in 2005.

Now working feverishly to feed this economic expansion, BHP Billiton Iron Ore is experiencing its own unprecedented demand and growth, the likes of which haven't been seen since European and Japanese reconstruction following World War II. Over the next 5 years, construction and expansion projects for its mining operations and related facilities are expected to exceed \$4 billion (USD), with the possibility of doubling or tripling (see "Overview of BHP Billiton Iron Ore" sidebar, page 2).

CADconform is a critical component in the overall approach for BHP Billiton Iron Ore (BHP BIO) to meet the engineering and construction challenges of this unex-



Area C Stockyard of BHP Billiton Iron Ore operations in Western Australia.

Case Study – Quick Look

CADconform at BHP Billiton Iron Ore:

- ▲ Big ROI from improved efficiency in drafting and minimizing rework
- ▲ Faster productivity for new drafters
- ▲ Enables CAD data re-use in advanced applications for access to new ROIs
- ▲ Solidifies BHP Billiton's position as a leader in important area of CAD Standards
- ▲ Contributes to the community of interest for CAD standards

pected but welcome need for rapid expansion and new development for its mining operations and related facilities.

A long time leader in use of standards for engineering and drafting, BHP BIO has had electronic CAD standards in place since the mid-1990s, but without the ability to reliably enforce use of standards.


With CADconform, BHP BIO has been able to:

- ▲ Measurably improve efficiency and productivity for both in-house and consultant-contractor drafters with estimated savings of \$3.25 million USD per project (see "Calculated Savings from CADconform" sidebar, page 3)
- ▲ Help new drafters become productive faster
- ▲ Facilitate management of large-scale multi-vendor projects by streamlining the assignment and reception of CAD drawing files and assuring 100% conformance to CAD standards
- ▲ Enable use of standardized CAD data for input to advanced applications and systems for access to new ROIs
- ▲ Solidify its position as a standards leader, providing a successful position to launch CAD standards use in other business sectors of BHP Billiton

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Administrator of CAD & Technical Information for BHP BIO Michael Hallam is the catalyst for bringing these benefits to all company projects. His responsibilities include manager of all design data for all projects (which includes issue and receipt of all hardcopy and electronic drawing files, both internally and to contractor-consultants) and for the maintenance of all Standard Engineering Practices (SEP) and CAD standards. Hallam has a long career in engineering and with the development and use of related standards. That career includes work at Western Australia's Main Roads Department where, in the 1980s, he was on some of the early teams developing the use of computerized graphics in engineering, and 14 years with BHP Engineering, the consulting engineering firm that undertakes design and engineering projects for BHP.

"With CADconform, we have the ability, the advanced software technology, to draw to a set of CAD standards and check to that set of standards to ensure that drawings conform 100% to the CAD standards as defined by the organization," states Hallam. "CADconform is cutting edge technology for the use of standards. It is the critical piece for companies to be able to reliably, affordably and successfully implement CAD standards. This is vital to achieve the integration of smarter systems to better manage project asset management."



"With CADconform, the original drafter—the best qualified person to make corrections—checks and conforms the drawing faster than anyone else could."

In Hallam's experience, similar tools have been available, but those tools still fall short of helping individual drafters to achieve standards conformance.

Life Before CADconform

BHP BIO has long recognized the importance of standards and has been on the cutting edge of implementing CAD standards electronically since the mid 1990s. Back then, without a comprehensive CAD standards solution on the market, BHP BIO did what other pioneers had to do: they built one themselves.

First, BHP BIO created an electronic version of its standards and created some drafting menus based on its standards within the drafting software. It purchased a checking product, supposed to have checked standards on CAD drawings. These items were distributed to both in-house and to contract drafters.

However, there were issues with this solution. For one, the standards could not be locked down, so contractors could change them. There were also issues with the checking software, and BHP BIO had no way to quickly check the CAD drawing files being returned from contractors to verify that the drawings conformed to standards.

Hallam explains, "You really had to call them sort of 'pseudo standards.' Because without the ability to lock down the standards or to ensure that the drawings being submitted from the contractors in fact conformed to the standards, the process was minimally effective and did not solve the quality issues with our data."

Life Since Implementing CADconform

BHP BIO began using CADconform in 2002, resulting in immediate, significant improvements to its drafting process and data quality. Currently all 30-plus in-house drafters and engineers use CADconform for drafting and checking for all work.

For contractor-consultants, it is part of the BHP BIO contractual requirements that all CAD drawings must conform to BHP BIO CAD standards

Overview of BHP Billiton Iron Ore

BHP Billiton is the world's largest diversified resources company, with many resources including iron ore. The company has more than 37,000 employees working at 100 operations in more than 25 countries around the world.

BHP Billiton was formed in 2001 by the merger of BHP and Billiton. The global headquarters of the combined BHP Billiton Group is located in Melbourne, Australia.

The Iron Ore Industry and Operations

The majority of the iron ore industry rests with just a few major companies, making the responsibility to respond to resurgent world demand great.

BHP Billiton Iron Ore (BHP BIO) is one of those major suppliers, with 6 mining operations in the Pilbara region of Western Australia, a remote, sparsely populated area in the north west part of the country (see map on page 3). In total, these mines are currently producing about 80 million wet tonnes of iron ore per year.

BHP BIO engineering and construction projects consist of maintaining and expanding all facilities and infrastructure related to the mining, processing, and transportation of iron ore. In addition to the mines and processing plants themselves, these projects include railway lines and related structures such as tunnels; facilities for train maintenance and storage; shipping berths; living quarters for construction and operation personnel; and general infrastructure including power, water, airstrips and access roads.

Impact on Work Volume and Flow

To execute these projects, BHP BIO relies on an internal team of 29 drafters and 20 to 30 contractor-consulting engineering companies, which have another 300 to 500 drafters among them.

In total, BHP BIO currently has about 150,000 drawings in their system. With the current planned maintenance and expansion projects, 20,000 of those drawings are in circulation, actively being updated at any given time. And an additional 10,000 new drawings with new unique drawing numbers are being issued each year. Add to the equation that, through the normal, design, engineering and construction process, each drawing is typically updated and issued 4 or 5 times, and the volume is staggering – 80,000 to 100,000 updated drawings per project!

and be returned to BHP BIO with the CADconform tamper-proof seal indicating conformance.

Once returned from the contractor-consultant, BHP BIO re-checks the drawings using the CADconform real-time management reporting feature, which lets them instantly confirm the tamper-proof seals are present and intact for thousands of drawings in a few seconds.

Benefits of Using CADconform

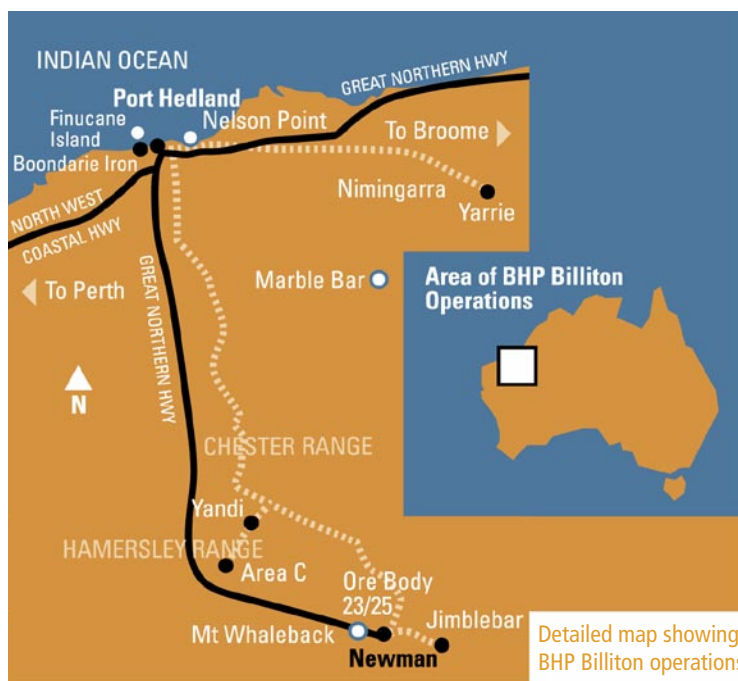
CADconform has several key benefits for BHP BIO drafting efforts and for the overall business.

Measurable improvements to efficiency and productivity for drafters

In a recent audit, a legacy drawing was checked with CADconform against BHP BIO's current CAD standards; CADconform determined the drawing conformed only 83% to current CAD standards. Using the CADconform Check/Fix feature, the drawing was corrected to 100% conformance in about 10 minutes.

Hallam estimates that drafting with CADconform's easy-to-use drafting menus based on standards could save a drafter, on a conservative average, 1.25 hours per drawing. (See "Calculated Savings with CADconform" sidebar, below.)

In addition, because drafters are now checking their own drawings as part of the drafting process, errors can be resolved more quickly and



Detailed map showing BHP Billiton operations.

efficiently. For example, only the person drafting knows whether or not the intent was for primary or secondary steel. A different person checking the drawing requires time-consuming research to determine the correct intended element. With CADconform, the original drafter—the best qualified person to make corrections—checks and conforms the drawing faster than anyone else could.

Faster productivity for new drafters

Whether drafters are new to the industry or new to your organization, CADconform helps them become more productive faster.

With the booming development in Western Australia, there is high demand for skilled drafters, so there is lots of job-changing.

"With CADconform, you don't have to throw new drafters a printed book and have them sort through it and guess what to do," remarks Hallam. "CADconform's easy-to-use drafting menus have the standards built right in, with the correct levels, colors, line weights and so forth. And with CADconform's administration features, you can give drafters access to only the subset of the standards they need for drafting in a specific discipline or for a specific project."

Facilitate Management of Large Complex Projects

Hallam asserts that manual checking efforts—apart from being no more reliable than manual application of CAD standards—are too time consuming and labor intensive, especially given BHP BIO's volume and urgency of projects. (See again "Calculated Savings with CADconform" sidebar, left.)

He explains that previous checking software had issues and could not get his organization to the level of conformance that CADconform can. With the ability to use CADconform's real-time management reports to check on hundreds or thousands of drawings at once, they now have a

Calculated Savings with CADconform

Using CADconform, BHP Billiton can save an estimated \$3.25 million USD per project.

The following calculations are based on:

- ▲ Drafting costs = \$50.00 (USD) per hour (based on current Australian drafting rates)
- ▲ 20,000 drawings issued per project, including updating existing drawings or creation of new drawings

Drafting and Checking with CADconform

Average time saved with CADconform = 1.25 hours per drawing
 1.25 hrs/drawing X \$50.00 USD/hr X 20,000 drawings =
 \$1,250,000.00 USD savings per project

Manual Process vs. CADconform

Conservative estimates say it would take 2 hours per drawing to do a manual check for conformance to CAD standards (no checking software). And of course, there would be no way to assure that this manual checking process was 100% accurate.

2 hrs/drawing X \$50.00 USD/hr X 20,000 drawings = \$2,000,000 per project for manual checking

Using CADconform, you can deduct the cost of manual checking (\$2 million) and add the savings from using CADconform (\$1.25 million) to derive the \$3.25 million total project savings.

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way to quickly check all drawings submitted electronically by the many consultant-contractor companies providing drafting services to BHP BIO.

If the drawings conform, BHP applies an additional CADconform tamper-proof seal (on top of the one required from the consultant-contractor submitting the drawings) as confirmation of standards conformance.

If drawings from contractor-consultants do not conform to CAD standards, they are returned to the submitting company for correction.

The ability to quickly report on hundreds or thousands of drawings with 20 to 30 different consultant-contractors makes that important verification step in the process possible, and allows BHP BIO to quickly move drawings to the next stage in the project or promptly return them for correction.

Improved Data Quality Means Valuable Data Re-use

With CAD data conforming 100% to CAD standards, Hallam identifies some immediate opportunities for new ROIs.

“CADconform is cutting edge technology for the use of standards. It’s the critical piece for companies to be able to reliably, affordably and successfully implement CAD standards.”

First, it provides the ability to better plan and manage future projects, based on creating reliable templates from standards-conformed data from similar current projects. For example, if a new advanced iron ore processing facility is needed at another mine, standards-conformed baseline drawings can be developed from a current project, reducing project design time and costs, providing benefit to BHP BIO as well as consultant-contractors.

Second, the standards-conformed CAD data can be used for input to advanced applications. Some potential application uses include GIS applications, for mining survey and planning systems (to track mining locations and avoid areas, such as national native areas) and 3D modeling software for facility and system design and maintenance.

But Hallam explains, to get this value, the data from the CAD drawings must be standards-conformed and ready to go—at whatever time and for whatever purpose a company determines. With CADconform as a seamless part of BHP BIOs drafting and checking process, the company CAD data is ready for the next opportunity for new ROIs.

Future for CAD Standards at BHP Billiton

In today’s competitive and demanding economy, companies have an ever-increasing need for the types of benefits, efficiencies and competitive advantages that can be gained through use of CAD stan-



Mine Operations Area C Processing Plant of BHP Billiton Iron Ore operations in Western Australia.

dards. And once implemented, people, individual workers, also see the benefits to working with defined CAD standards.

“CADconform is the missing link to get over the sometimes painful standards-implementation hump and onto the benefits of process efficiency and standards-conformed CAD data,” remarks Altiva Software CEO Philip Hurlston.

With the success of CAD standards for BHP BIO, other organizations in BHP Billiton, not wanting to reinvent the wheel and wisely willing to build on existing successes, are seeking out Hallam for assistance with CAD standards implementation. He explains that he has sent the current CADconform solution to sites in Indonesia and several other groups in Queensland, Australia.

“This is absolutely the right direction for BHP Billiton Iron Ore, and I believe fully in this approach of using CADconform to assure data quality and maximum drafting efficiency,” asserts Hallam.

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Altiva Software – the only company dedicated to CAD standards management

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