

# Metal Products

ActiveFactory software, InTouch HMI, Wonderware Historian

BHP Billiton

## BHP Billiton's Hillside aluminium smelter replaces its extensive SCADA facilities

by Wonderware Southern Africa

*“Our philosophy is to simplify and adopt rather than adapt. This implementation is aligned with that viewpoint and provides us a sustainable platform for our SCADA environment.”*

Paul S Venter  
(Pr Tech Eng),  
IPS Superintendent,  
BHP Hillside Aluminium



VALUE DRIVERS	KEY METRICS
<b>Goals</b> <ul style="list-style-type: none"><li>• Replace existing VXL supervisory system.</li></ul>	<b>Wonderware Solutions</b> <ul style="list-style-type: none"><li>• ActiveFactory software;</li><li>• InTouch HMI;</li><li>• Wonderware Historian.</li></ul>
<b>Challenges</b> <ul style="list-style-type: none"><li>• Solution needed to be compatible with BHP Billiton's other smelters at Bayside and MOZAL (MOZambique Aluminium);</li><li>• Managing large volume of variables;</li><li>• Development team management;</li><li>• End user coordination.</li></ul>	<b>Results</b> <ul style="list-style-type: none"><li>• Full product offering and seamless integration with its own as well as third-party products;</li><li>• Redundant I/O servers and historians were configured without any additional code being necessary;</li><li>• Improved reporting;</li><li>• Improved system diagnosis;</li><li>• Improved standardisation.</li></ul>

**Company Overview**  
BHP Billiton – Johannesburg, South Africa  
BHP Billiton is an international company that adopted its current structure in 2001 as the result of a merger between BHP and Billiton two of Australia's mining and natural resource giants. BHP, incorporated in 1885, was a leading global natural resources company, with a diversified commodity suite that included minerals, oil, gas and steel. Billiton, whose roots go as far back as 1860, was one of the world's premier mining companies, with a portfolio of best-in-class mining and metals operations. The merging of these two companies resulted in a world leader that built on the past by combining each of their assets and utilising the very best of their skills and people. Today, BHP Billiton is ideally placed to lead the resources industry into the future.

When the southern hemisphere's largest aluminium smelter, delivering 685 000 tons of product per annum, decides to replace its entire SCADA system while doing business as usual, there's no room for mistakes. There's even less room for doubt as to the suitability of the chosen replacement and those who will provide it.

With the vision of being the world's leading aluminium smelter, BHP Billiton's Hillside Aluminium facility near Richards Bay in Kwa-Zulu Natal wanted to replace its existing VXL supervisory system. At the same time, any chosen solution needed to be compatible with BHP Billiton's other smelters at Bayside and MOZAL (MOZambique ALuminium).

### Background

VXL had been the supervisory system in use since the commissioning of Hillside. It is a supervisory control HMI for the OpenVMS platform. In use since 1995, VXL is known for its ease of use and the many hardware connectivity options it affords.

The need for upgrading happened when the hardware platform in use was nearing its end-of-service date as it had been in use for over 6 years. The software version had been in use for over 12 years. Furthermore, there was a need to improve diagnostic functionality, which would make fault finding and maintaining more efficiently.

Hillside was already an existing customer of Wonderware solutions and was familiar with the company's level of support and product capability. The other two smelters in the group were also using Wonderware solutions and it made sense to align all three smelters to the same technology. This would allow the BHP to capitalise on existing skills and experience based on trusted technology.

*"Another reason for choosing Wonderware was because of its full product offering and seamless integration with its own as well as third-party products,"* says Juan le Roux, Project Manager at Convenient Software Solutions, BHP Billiton's chosen system integrator for this project.

### Solution selection

In fact, two of these third-party solutions were key to the successful implementation of the project as shown in the following list:

- Wonderware InTouch HMI/SCADA was chosen for its rapid application development and rich features such as smart symbols;
- Wonderware Historian (formerly known as IndustrialSQL Server or InSQL) was selected for its track record as the world's most popular real-time database and its proven performance;
- Wonderware ActiveFactory software was the historical

as well as real-time data-reporting tool of choice for its flexibility;

- Software Toolbox's Top Server was selected as the I/O server for its ability to handle larger volumes of data, its full OPC compliance and ease of configuration;
- MDT's Mass AutoSave was selected to handle the backup and revision control for all InTouch HMI applications (AutoSave together with InTouch HMI's NAD greatly helped change management and rollout).

### Solution implementation

A new tag naming convention in line with the ISA standards was implemented in order to be more descriptive of plant areas and devices. This was followed by the definition of security and alarming requirements as well as the communication method and architecture.

Documentation requirements for the project were identified and developed and during this phase of the project, plant operators and production personnel were consulted to ensure an operator-friendly graphical interface and navigation screens. A complete thin slice of the system was set up and tested before role out could commence.

The Hillside site consists of the treatment and logistics, carbon, cast house and substation logical process areas (see figure 1). All of these areas are controlled by more than 230 Allan Bradley PLCs that monitor over 220 000 tags whose processes are being displayed on more than 2000 InTouch mimic diagrams.

The first thing to note about the system topology (see figure 2) is the simplicity of the design. This allows for easy maintenance and deployment of new nodes. Redundancy allows for maximum up time and system availability, key factors for real-time process control.

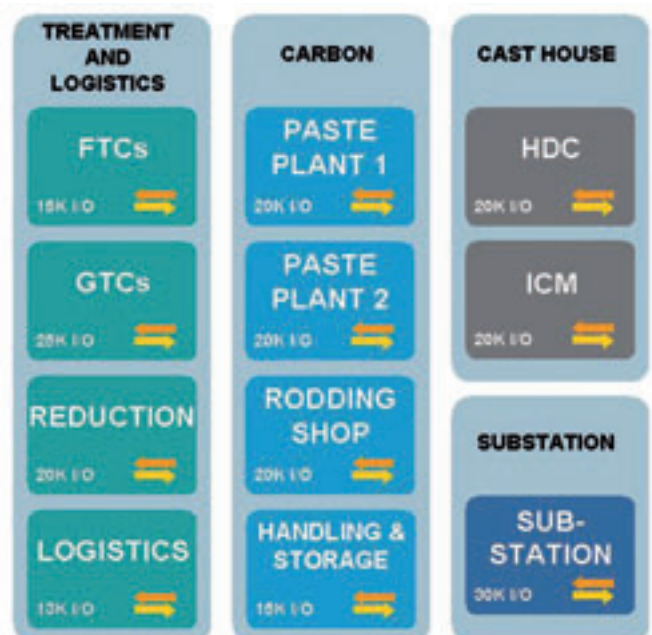


Figure 1: Hillside's four logical process areas

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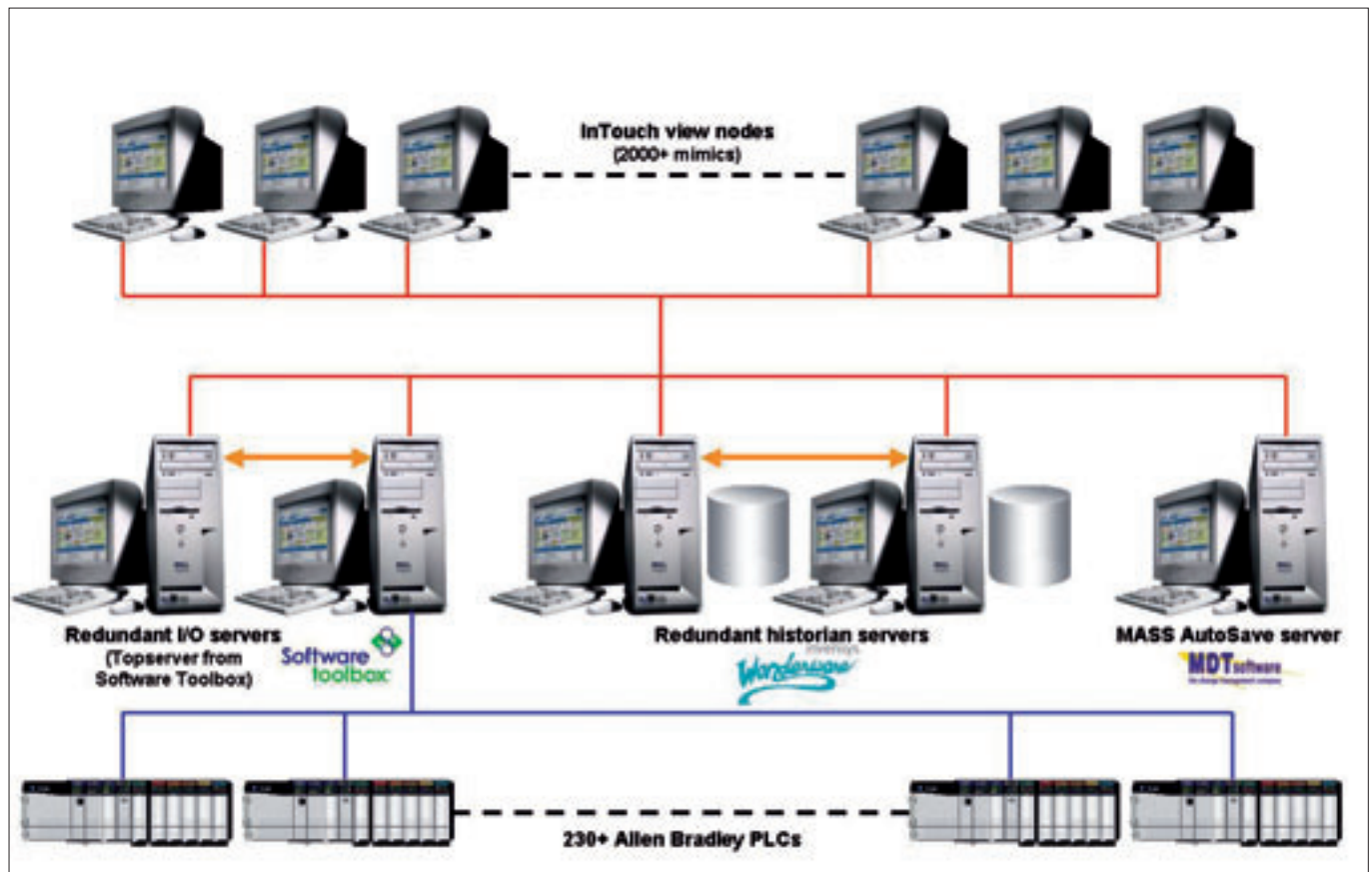


Figure 2: Hillside's topology diagram

"Thanks to the easy configuration facilities provided by the software, redundant I/O servers and historians were configured without any additional code being necessary," says le Roux.

FAT testing, which involved automation specialists, production personnel and operators, was done on an area by area basis starting with Treatment and Logistics followed by Carbon then Cast house and lastly Substation. "Once we completed the design phase and FAT testing, we started to load all the InTouch view stations," says le Roux.

"This was followed by loading MSSQL, Wonderware Historian and Topserver onto their respective servers. Thanks to easy to follow prompts, the set up and licensing proved very easy. As we were working on a live plant, it was decided to run both old and new HMI systems in parallel. This allowed system users to report any bugs. The importance of thorough pre-commissioning testing can't be over-emphasised. The more testing there is, the smoother the commissioning. In this case, the end result was a fully-tested and proven system with zero downtime."

## Challenges

Some of the challenges that CSS faced were:

■ **Managing large volume of variables** - A unified tag naming convention had to be created throughout the solution, which meant that all the tags used by InTouch, Top server and Wonderware Historian needed to be

aligned. As different plant areas were implemented by various contractors, this posed a challenge to create a single standard throughout the plant without redeveloping the PLCs. According to Le Roux, this is the single most important step in a project of this nature. "If standards are clearly defined from the start less time will be spent later in the project to correct/change current standards," he adds;

■ **Coordinating with end users** - In any corporation, it is difficult to reassign skilled staff to a development team for testing without sacrificing the plant maintenance and support requirements. This requires careful management, a high degree of understanding and collaboration from all involved as well as the clear definition of roles and responsibilities if the project milestones are to be achieved;

■ **Development team management** - Managing many software developers working in a single user development environment always poses a challenge unless everyone involved can focus on their common goal and their contribution in achieving it.

## Derived benefits

■ **Improved reporting** - allows for sound business decisions based on actual fact rather than guesswork;

■ **Improved system diagnosis** - Previously, automation specialists were unable to drill down to the device level to determine PLC I/O and status. This is now available even to operators who are proactively assisting in reducing plant downtime;

■ **Improved standardisation** - Bringing all of Hillside's plant areas onto the new platform has ensured a standard HMI implementation across all three BHP Billiton aluminium smelters, thereby expanding the resource pool skilled to support the applications;

■ **Open door for future growth** – the chosen solutions provide Hillside Aluminium with virtually unlimited potential for visualising, analysing and optimising their entire aluminium smelting process to the benefit of its bottom line.

*“The previous system, although very stable, was a closed environment to the users and data was only accessible through the physical nodes,” says Paul S Venter (Pr Tech Eng), IPS Superintendent at Hillside Aluminium Southern Africa. “With the implementation of the historian, information is now freely available at the users’ workstations, allowing for faster response to plant events. The obscurity of the previous system was also overcome with the ability to implement enhancements far more easily than before and therefore delivering business benefit faster and at reduced cost.”*

*“The future scalability of the SCADA implementation was also improved through additional functionality to include plant documentation and loop drawings. This will enhance fault-finding abilities of maintenance personnel and improved understanding of operational personnel.”*

## What's next?

At the publication time of this article, the current progress of the project is that 100% of the Treatment and Logistics area has been addressed as well as 80% of the Carbon area. At present, 45% of the Cast House area and 20% of the Substation area are operating with the new SCADA system. However, it is envisaged that by the end of September 2008, Hillside Aluminium will be a Wonderware-only site with the decision-support tools that will allow the plant to achieve its worthy objective of becoming the world's leading aluminium smelter.

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