Project Magnet extends the life of Whyalla Steelworks

Rockwell Automation delivers an integrated pit to port solution to provide a new lease on life for Whyalla Steelworks

Background

Arrium Mining is a leading Australian resources company, currently exporting at a run rate of 12 million tonnes of hematite ore to China per annum from its Middleback Ranges and Peculiar Knob mining operations in South Australia. The company has three key businesses: Mining, Mining Consumables, and Steel & Recycling.

A significant milestone in the company’s history occurred in 2005 when Arrium decided to diversify into the resources sector through Project Magnet which would convert the Whyalla Steelworks to magnetite iron ore feed, creating a new revenue stream for the company by making available hematite iron ore for export sales.

A project of this magnitude would require a completely integrated control system, enabling visibility for any operator station across the pit to port operations. To achieve this, Arrium Mining called on the combined expertise of Rockwell Automation and Recognised System Integrator, LogiCamms, to deliver an innovative solution that would not only extend the life of the Whyalla Steelworks but also reduce the cost of steelmaking while also incorporating environmental improvements.

Challenge

- To develop a completely integrated control system across the pit to port operations of Whyalla steelworks within a tight timeframe.

Solutions

Project management
- High level support from the Software Business Unit at Rockwell Automation.

Integrated Architecture
- Multiple redundant ControlLogix systems.
- FactoryTalk® View HMI.
- Low and Medium Voltage Drives.

Safety systems
- Intelligent motor control.
- Motor Control Centres.
- Guardmaster® safety relays.

Network solution
- Complex fibre optic Ethernet communication network.

Results

Reduced cost of steelmaking
- Extend the life of the Whyalla Steelworks from the 2020 constraint to at least 2027.
- Increase annual sales from one to six million tonnes per year (now at a run rate of 12mtpa courtesy of the Whyalla Port Expansion Project).

Environmental benefits
- Reduction in fugitive dust emissions resulting from conversion of pellet production from a dry to a wet process.

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Full integration from the pit to port

Rockwell Automation and LogiCamms, a leading engineering, project delivery and asset management company, have a longstanding history of delivering fully integrated solutions and Project Magnet is no exception. According to Greg Schultz, Executive Account Manager – Mining, Rockwell Automation, “This project highlights a complete pit to port operation from a control point of view.”

With the mine site located approximately 60 kilometres from the Whyalla Steelworks, a slurry pipeline was built to allow magnetite to be transported through the pipe to Whyalla. Concurrently, hematite ore continued to be transported by rail to the port for shipping.

The three main areas of the operation that required complete control system integration were the materials handling area, which involves the handling and storage of hematite for export; the filter/flux area which receives magnetite from the slurry pipeline and prepares it for feeding to the existing pellet plant, and the mine concentrator area.

A challenging aspect of this project was the distance involved in connecting the concentration plant which was near the mine site to the filter/flux which is located at the steel works more than 60 kilometres away.

“This was addressed by utilising Ethernet across a large fibre optic network. FactoryTalk View provided visibility at any operator station across the whole of the pit to port operation,” said Schultz.

“It was a complex installation that utilised a number of redundant HMI servers across the expansive network,” he continued.

To provide reliable and secure control system integration based on the ControlLogix platform, multiple control systems were utilised that were completely redundant by the controllers and the HMI servers. Low and Medium Voltage drives were also provided for the pumping and crushing equipment and safety components including Guardmaster safety relays were incorporated into the motor control centre design.

LogiCamms realised project development time saving benefits through the Rockwell Automation Integrated Architecture solution, with the use of direct-referenced tags and User Defined Tag structures. The project wide SCADA solution with FactoryTalk View SE, provided client screens that could view any graphic from anywhere in the application, with minimal extra configuration. Maintenance of the entire application is possible from engineering workstations in any area.

“This application was one of the largest FactoryTalk View applications to be completed at the time and high level support from the Software Business Unit of Rockwell Automation was invaluable in the success of the solution,” said Andrew Thompson, Senior Engineer – Control Systems for LogiCamms.

According to Jonathon Deluao, Principal Control Systems Engineer, Arrium Mining, “The solution has provided full integration and a high level of process control which gives us the ability to control and modify the system according to the production needs.”

“We now have a fully automated plant that is flexible enough to cater to our needs both production wise and process wise,” continued Deluao.
From dry to wet

The transition of the Whyalla Steelworks from hematite to magnetite feed has changed the iron ore pellet process from a dry to a wet process. As the magnetite ore is pumped via a slurry pipeline from the mine to the steelworks, the level of fugitive dust emissions are reduced which greatly benefits the Whyalla community.

Project Magnet has also fostered the use of covered facilities for loading iron ore and the relocation of the crushing and screening area to the mine site, which has resulted in further improvements in environmental conditions for Whyalla.

Under Project Magnet, a trans-shipping service has been introduced to avoid major dredging of the Whyalla Port and a new fleet of high-sided wagons has been put into service. The benefits from Project Magnet play an important part in enhancing the sustainable competitiveness of the Whyalla Steelworks.

A new lease on life

The successful implementation of Project Magnet has essentially provided a new lease on life for the Whyalla steelworks by extending the lifespan from the expected 2020 constraint imposed by hematite ore reserves, to at least 2027.

Using magnetite ore in a concentrated form of feed has resulted in freeing the hematite ore reserve for accelerated sale and export—increasing annual sales from one million tonnes up to six million tonnes, with the Whyalla Port Expansion Project now enabling Arrium Mining to reach a run rate of 12 million tonnes.

Based on the success of Project Magnet, Arrium Mining has opened another mine using a complete solution from Rockwell Automation. “We have migrated to a completely integrated Ethernet network with advanced segregation and security components,” said Deluao.

Through combining leading technology with high level domain expertise, Project Magnet has resulted in a completely integrated pit to port solution that continues to provide many benefits to the Whyalla and South Australian communities.