

Liberty Primary Steel Secures the Reliability of Structural Steel Production

Control- and drive-system upgrades mitigate the risks of extended production outages, future-proofing structural steel production for construction projects

Challenge

To mitigate the risk of extended production outages by upgrading the control and drive system of the straightener machine at Liberty Primary Steel Whyalla.

Solutions

Control and Drive System

- Allen-Bradley® PowerFlex® 755 drives with Safe Torque Off delivered high performance and enhanced safety options
- Allen-Bradley GuardLogix® PAC provided control and safety over an Ethernet network

Global Solutions

- The Rockwell Automation Global Solutions team provided engineering design, equipment supply and commissioning services

Information Solutions

- FactoryTalk® View Machine Edition provided the operator interface, delivering ease of integration and improved diagnostics

Results

Improved Production Capacity

- Production capacity increased by 40 percent

Reduced Downtime

- Improved fault-finding on the straightener machine offers reduced operational risk and downtime



Liberty Primary Whyalla Steelworks is an integrated steelworks with a production capacity of approximately 1.2Mtpa of steel

Background

Australia has one of the most dynamic steel industries in the world, producing approximately 5.3 million tons of steel annually of which about 1.6 million tons is structural steel.

Structural steel is one of the most commonly used materials in commercial and industrial construction due to its strength and sustainability.

The Liberty Primary Steel Whyalla Steelworks is located at Whyalla, South Australia, approximately 400 kilometres north-west of Adelaide. It is an integrated steelworks facility with a production capacity of approximately 1.2Mtpa of steel using a Blast Furnace Steelmaking process.

Approximately 65 percent of the steel produced is transferred by rail in billet form to domestic and international markets, and the remaining steel is converted into finished products in the form of structural steel and rails through the Whyalla Structural Mill.

With a strong commitment to securing steel supplies for the construction industry, Liberty Primary Steel Whyalla engaged Alliance Automation, a Rockwell Automation Recognized System Integrator, to upgrade a main section of plant machinery – the E&S Straightener.

No time for downtime

Commonly used in construction, straight steel beams form the foundation for commercial, industrial and residential buildings. Therefore, supplying straight steel beams of varying sizes is a key priority for Liberty Primary Steel Whyalla.

At the heart of the steel straightening process is the E&S Straightener machine which was first installed in 1988 with the primary function of straightening steel beams. More recently, the straightening machine was experiencing reliability issues resulting in downtime and loss of productivity at the plant.

Alliance Automation designed a control- and drive-system upgrade to mitigate the risk of extended production outages at the Liberty Primary Steel Whyalla Steelworks due to issues with the obsolete automation system of the straightener machine. Rockwell Automation was also engaged to help with product selection and drive system engineering.

“The straightener is a critical piece of equipment at the Whyalla plant, with approximately 70 percent of products going through the machine for straightening,” explained Barry Gardner, senior engineering project manager, Alliance Automation.

“The obsolete DC motors on the straightener machine were requiring significant maintenance every week to remove dust and scale resulting in production downtime. Given the significant costs involved in purchasing a new DC motor, a decision was made to move to an AC drive system which offers improved reliability and reduced maintenance costs,” he said..

New control and drive system

Motor and drive technology has advanced significantly over time, now offering more flexibility and higher performance than ever before. Rockwell Automation and Alliance Automation worked closely with Liberty Primary Steel to gain a detailed understanding of the straightener machine to identify the most appropriate solution for the upgrade.

The straightener machine contains four individually driven rolls and as the steel bar enters the machine it moves through the first roller and then moves through the remaining three rollers sequentially. Given the load sharing and safety requirements of the machine, the Allen-Bradley® PowerFlex® 755 drives with Safe Torque Off over Ethernet were selected as the most appropriate choice for this application.



The E&S Straightener machine straightens steel bars of various diameters

“Drive control was critical to the success of the project so a significant amount of research was undertaken to select the most appropriate motor and drive sizes,” explained Peter Tomazic, business development manager, Rockwell Automation.

Allen-Bradley GuardLogix® programmable automation controller provided high level control for the straightener machine with POINT Guard I/O™ module used in combination with the PowerFlex 755 Integrated-Safety Safe Torque-Off card suitable for achieving safety integrity levels up to SIL3 (AS 62061) and an emergency-controlled stop (as per AS 60204) to allow a fast and safe stop of all moving equipment. A PanelView™ Plus 7 Graphic Terminal and FactoryTalk® View Machine Edition provided the operator interface, delivering ease of integration and improved diagnostics.

The new system has the ability to increase production capacity by 40 percent based on reliable higher speeds.

“The drive system application knowledge, together with the service and support provided by the Global Solutions team at Rockwell Automation was a key contributor to the success of the project. It was a truly collaborative working relationship with skill set sharing between both Alliance Automation and Rockwell Automation,” said Gardner.

The new system was tested offsite to help ease the commissioning process. Pre-testing and careful planning helped to ensure the system was up and running ahead of schedule. The first beam went through the E&S machine very smoothly, thanks to the robustness and well-proven Rockwell Automation Drive Systems code for load sharing applications. Commissioning was a very quick process and involved one day for unloaded motor tests and one day with products. Production resumed on the third day under monitoring by a Rockwell Automation engineer.

Securing structural steel supply

The collaboration between Liberty Primary Steel, Alliance Automation and Rockwell Automation has helped to significantly improve both the reliability and productivity of the straightener machine at the Whyalla plant.

“The collaboration with Rockwell Automation gave Liberty a lot of confidence that we had a workable solution right out of the box. This confidence was realised with the project progressing through integration and commissioning with minimal issues and a smooth transition to operation,” said Andrew Harding, project manager, Liberty Primary Steel.

“Similarly, Alliance brought a significant level of expertise and plant knowledge to the table, by providing strong oversight during the installation and integration activities. The combination of the two entities working with the Liberty team delivered a successful project within an aggressive ‘shutdown’ schedule where the end date could not be exceeded,” he said.

The new system has the ability to increase production capacity by 40 percent based on reliable higher speeds. In addition, the straightener machine’s lifecycle has been optimized to offer greater machine performance and reduced operational risk, while improved fault finding has helped reduce downtime at the plant.



Rockwell Automation and PartnerNetwork companies collaborate to help you develop an ongoing approach to plant-wide optimization, improve your machine performance and achieve your sustainability objectives.

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