

Solution

- Rockwell Automation control system that precisely interfaces with the OEMs equipment
- Distributed Power System drives and AutoMax based Master Controller with Flex I/O and Allen-Bradley 1771 I/O
- PanelView 900 for process monitoring

Results

- Completed ten days ahead of schedule, significantly reducing losses accrued due to shutdown
- Mills began operation at desired rolling speeds within 30 days of commissioning
- Increased productivity and reliability, improved product quality while reducing waste and downtime
- Digital regulation led to improved mill performance and simplified start up

Rolling mill modernization helps Indian Aluminium giant become more competitive in the export market

Rockwell Automation solution helps INDAL increase uptime and productivity, while reducing downtime by over 35% and product rejection rate by over 40%.

Background

In business for over six decades, Indian Aluminium (INDAL) is a pioneer in India's Aluminium industry and one of India's largest Aluminium manufacturers. As a member of the Aditya Birla Group and a wholly owned subsidiary of Hindalco Industries, INDAL belongs to the largest Aluminium manufacturing conglomerate in India. Annual revenue is US\$290 million.

INDAL produces alumina, Aluminium sheet products, foil products, and extrusions for domestic and international markets. With ten locations across India, INDAL's business units include bauxite mining, alumina refining, Aluminium smelting using captive power, fabrication, and recycling.

INDAL has four rolling mill divisions in India. Sheet rolling units are in Belur (near Calcutta) and Talaja (near Mumbai), and foil rolling plants are in Kalwa (near Mumbai) and Kolar (near Hyderabad). The Talaja sheet plant has two strip rolling mills: the Canron Mill (intermediate) and the Davy Mill (finishing).



Challenge

In 1999, INDAL decided it was time to completely modernize the controls of two mills at Talaja to become more competitive on both the domestic and export market and realize their vision of becoming an industry leader. The management felt that the mill electrics had become obsolete and did not deliver the desired results. The lack of automated controls resulted in high downtime, inconsistent product quality, fluctuation of operating cost, customer dissatisfaction, and loss in market share.

INDAL approached Rockwell Automation India through Kvaerner Metals Davy Limited, an OEM who had a good working relationship with Rockwell Automation, to retrofit as well as modernize both mills with new control systems and solutions. Key objectives for the project included improving product quality to meet international standards, reducing the cost of production through improved productivity, increasing the consistency of quality through automation and reducing waste, customer rejection and rework. Improving productivity required optimizing rolling speed, reducing coil turnaround and roll changeover time, and increasing yield per pass.

The upgrade required a complete and clear understanding of mill operations and desired future enhancements to plan the appropriate migration path. While the task was relatively simple for Canron Mill, it posed a major challenge for Davy Mill, since most of the technical data for the mill had been destroyed in a recent fire.

To acquire the information it needed, Rockwell Automation India interviewed plant engineers and the original mill builder, Kvaerner Metals Davy Limited, to learn more about its old electrics and control system.

The interviews revealed that frequent breakdown of old electrics and controls were resulting in long periods of downtime. The breakdowns were associated with lengthy startup procedures due to multiple operating stations employing an outdated hard-wired relay—logic system, which needed regular maintenance. With limited documentation and diagnostics,

troubleshooting was extremely difficult. Moreover, obsolete spare parts were scarce and expensive to procure.

To minimize downtime and daily losses of US\$410,000 due to shutdown caused by the mill fire, INDAL required that a solution comprising hardware, software integration, startup, and commissioning be implemented within 110 days.

Solution

Like many companies, INDAL uses a variety of branded equipment. Rockwell Automation solutions are designed to be integrated in exactly this type of environment.

Rockwell Automation India proposed a control system that would precisely interface with the OEM's equipment. The system is designed around Rockwell Automation Distributed Power System (DPS) drives and an AutoMax-based Master Controller with Flex I/O and Allen-Bradley 1771 I/O. This modular system delivers power to the motor and signals to the customer's existing sub-systems and is integrated to Voest Alpine's Automatic Gauge Control (AGC) and Automatic Flatness Control (AFC) systems.

The Power Module Interface provides digital regulation for the main mill, coiler, and pay off. It communicates with the Universal Drive controller on the main AutoMax rack through a fiber optic network, which is capable of interfacing with different brands of power modules. PanelView 900 provides the human machine interface (HMI) for process monitoring. An Ethernet (TCP/IP) network interfaces with the auto shape controller.

The system is connected to the mill management system. Data can be shared with mill operators to control recipes for optimum rolling.

Results

The entire project was completed ten days early, significantly reducing losses accrued due to shutdown. INDAL was able to start operating both mills at desired rolling speeds within just 30 days of commissioning of each mill.

Rockwell Automation was able to resurrect and completely modernize the aging mills. Integration between the distributed power system and controls such as AGC and shape control has been seamless. Digital regulation has meant improved mill performance and simplified startup. PLC-based logic and sequencing, complete documentation, and detailed diagnostics through Sigma and PanelView 900 have made maintenance much easier.

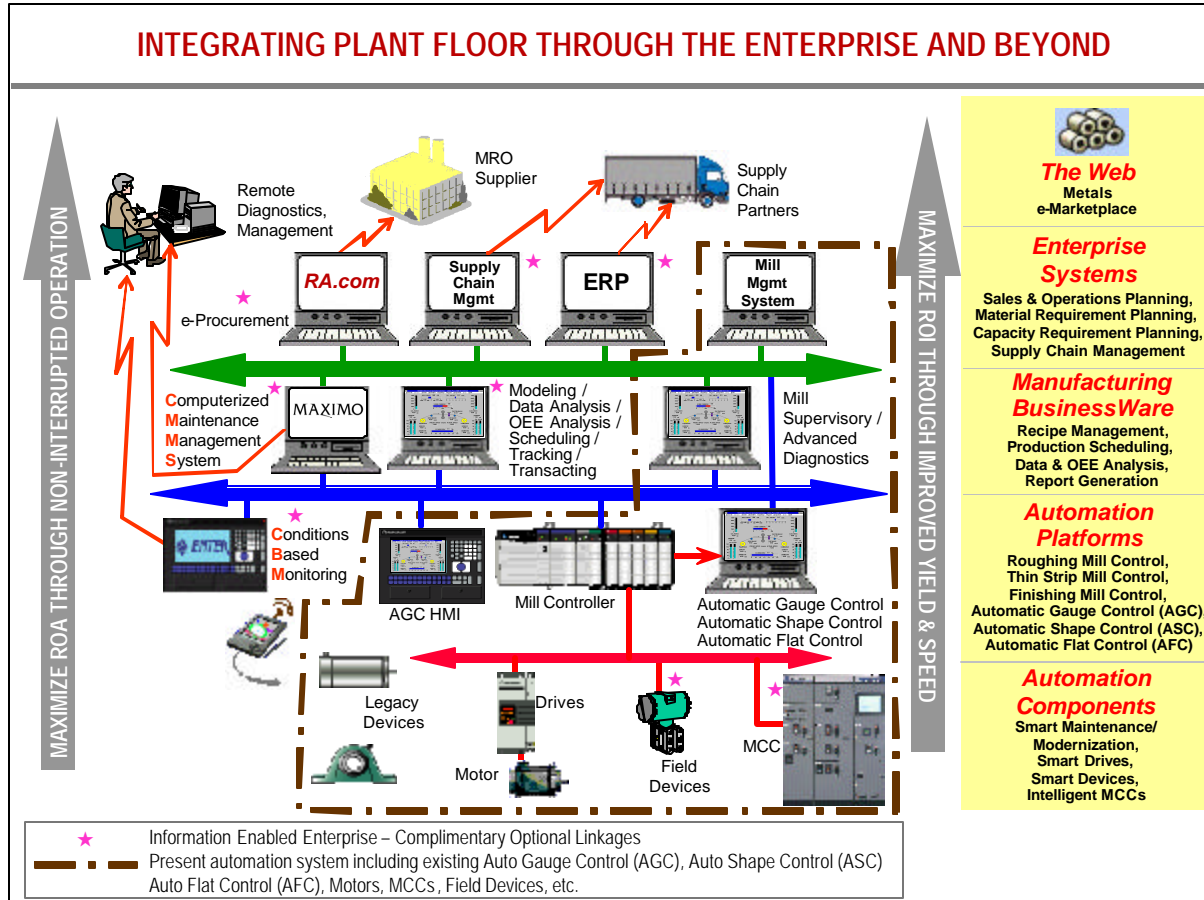
The upgrade has increased productivity and improved product quality, while reducing waste and downtime. The upgrade has increased the reliability of the Canron mill and the Davy mill. The breakdown hours for Canron mill have been reduced by 37% and for Davy mill by 39%. The rejection rate due to quality issues was reduced by 41%, while recovery of the highest contribution product improved by 33%. Canron mill roll change time also was reduced by 50%, increasing uptime and productivity.

"Rockwell Automation's solution has made us more competitive in the export market," says S Majumdar, Chief Executive - Engineering, INDAL. "The project has helped INDAL improve operational efficiencies and product quality. It has resulted in increased production and an excellent return on investment."

The architecture below depicts Rockwell Automation's concept of an Information Enabled Enterprise. The area outlined with

a brown dash line represents the present automation level under discussion in this document. The remaining portion illustrates

a host of solutions that Rockwell Automation can provide today to integrate the plant floor to the enterprise and beyond.



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