

## TISCO increases productivity, saves 8-10% on steel conversion cost and extends refractory life by 10%

Rockwell Automation solution saves US\$3 million annually while improving quality, productivity and operating cost for Asia's first and India's largest private sector steel manufacturer.

### Background

Since it was founded in 1907, Tata Iron and Steel Company (TISCO) has emerged to become the world's leading steel maker, as ranked by the World Steel Dynamics (WSD). TISCO is Asia's first and India's largest integrated private sector steel company. Its annual revenue is US\$1.6 billion.

With its technologically up-to-date manufacturing facilities, TISCO is one of the lowest cost steel producers in the world. It is one of only twelve companies in the world to be identified as a "world class steel maker" by WSD.

TISCO's hot strip mill has an annual capacity of 2 million tons. Its cold rolling mill complex has a rated capacity of 1.2 million tons. Its long product mills manufacture electrode welding rods, tire beads, billets, automobile forgings, and high-carbon and pre-stressed wire rods.

### Challenge

TISCO required a solution that consistently produces high-quality



steel, while increasing productivity by improving shop logistics. To improve steel quality, TISCO needed to control temperature and composition, including higher Ferro and carbon content.

TISCO also sought to reduce global tap temperature to decrease steel conversion costs and extend refractory life. It also wanted to reduce plant energy costs, stoppages, product waste, and reprocessing.

To minimize downtime, the solution had to be delivered according to a strict project schedule.

### Solution

TISCO installed an automated ladle heating furnace between the primary and secondary processes. The company supplying the system to TISCO recommended another vendor to provide the automated control system for the furnace.

However, TISCO insisted that Rockwell Automation provide the furnace control system. A satisfied customer for over ten years, TISCO was confident in Rockwell Automation's ability to develop a single source turnkey solution using world class products while providing the highest level of

local support. Rockwell Automation has a proven track record for developing similar solutions for the metals industry.

Rockwell Automation's Global Manufacturing Solutions Group assumed complete responsibility for the control system, including design, engineering, supply, installation, commissioning, software development, and staff training. Start-up was completed within only 15 days.

Rockwell Automation's solution consists of redundant Allen-Bradley PLC 5/60s connected through a 1771 Universal I/O system. The PLCs communicate with third-party systems over Modbus and with RS232 and the plant main computer via Ethernet. RSView32 provides the human machine interface (HMI) over an integrated network to the PLC. Allen-Bradley's specially designed high speed counting modules measure fast pulse inputs from a third party level detection system.

The system provides fully automated control of electric heating, de-sulphurization, alloying/fine trimming (FAFA), slag management, homogenization of the ladle contents, and the wire feeder/automatic lance. It also controls the hydraulic, cooling, fume extraction, purging control, and automatic sampling systems.

Because of the high level of electro-magnetic interference (EMI) caused by the electrode arc heating process, the computer monitors are enclosed in an EMI shielded enclosure.

## Results

As a result of Rockwell Automation's solution, TISCO estimates that it saves US\$3 million annually.

The fully automated furnace control system has improved productivity. Because of this control system and other improvements carried out in the plant, throughput has increased from 45,000 tons to 55,000 tons per month.

Global temperature — the average tapping temperature from Vessel — has been reduced by 10-15 degrees Centigrade. This reduction in temperature alone saved 8-10% of steel conversion cost. Moreover, the reduced temperature has extended refractory life by 10%.

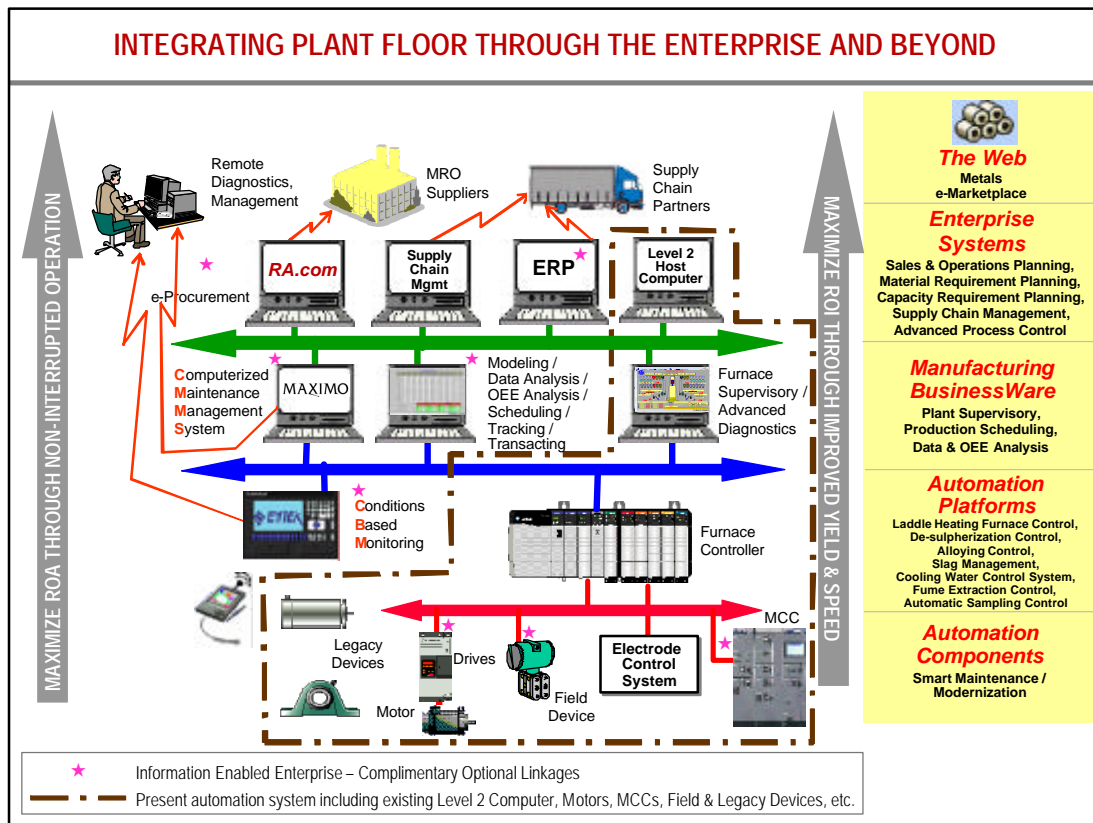
Product quality has also improved. The strike rate — the targeted grade of steel against diversion — in high carbon steel has been improved by 15%, while flux and ferro alloy consumption has been reduced by 2-3%.

"The automation system for the ladle heating furnace developed by the

Rockwell Automation Engineering Solution team has exceeded our expectations in every way," reports H.J. Billimoria, manager of operations, TISCO. "The system is robust and very reliable. It has been trouble free since commissioning. Diagnostics information is relevant and very handy, and RSView software is user friendly and informative.

"We also appreciate the excellent training provided to our personnel, and after-sales support is prompt and effective."

The architecture on the following page 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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