

# Automation helps cement plant increase production from 1,500 to 3,000 tons/day, contributing to additional US\$15 million annual revenue

By implementing a Rockwell Automation control system, OCL India's cement plant has maximized capacity while minimizing plant shutdowns and cutting specific energy consumption by 27%. OCL India estimates that the payback of automation investment is less than a year.

## Background

Since entering the field of refractory manufacturing in 1954, OCL India Limited has since grown to become the largest refractory plant in India. OCL India produces a number of high quality refractories including silica, alumina, basic, magnesia carbon bricks, continuous casting, purging, castables, and precast blocks.

With an annual gross revenue of US\$45 million, OCL India has established a solid brand image in its markets, enjoying a wide reputation for producing high quality cement and refractories. OCL produces 1.1 million tons of cement annually and is installing equipment to enhance its capacity to 2 million tons, mainly for the Indian states of Orissa, Assam, Bihar, and West Bengal. It also exports its cement to Bangladesh, a growing country with a booming construction market.

## Challenge

Production at OCL India's cement plant runs non-stop, 24 hours a day, seven days a week. As a result, any interruption in production can cause significant delays and lost revenue. For



example, when the process for converting limestone to clinker breaks down, the kiln must be reheated to 1,400°C, while auxiliary equipment must be restarted one by one. Restarting and stabilizing this key process can shut down operations anywhere from a half hour to eight hours.

Reducing energy costs is another high priority for OCL India. Energy is the single largest operational cost for a cement plant. Each stage of the cement production process is highly energy-intensive — product size reduction alone accounts for 70% of total energy consumed.

## Solution

OCL India required a automation control system that improves the consistency of product quality, ensures stability of the cement production process, minimizes specific power consumption, controls pollution and automates operations to the greatest extent possible.

To address these needs, they selected Rockwell Automation to develop an automated control system for the cement plant. In addition to the company's superior products and expertise, Rockwell Automation had established a strong reputation in the



region. Global Manufacturing Solutions of Rockwell Automation India has provided a complete control and automation solution for the raw mill crushing and grinding, coal mill, preheater, kiln, cooler, clinker storage, cement grinding and packaging machines. Over the years, Rockwell Automation has upgraded the control system to maximize plant efficiency and capacity.

Rockwell Automation's solution consists of Allen-Bradley's PLC5/60 with hot back-up, more than 8000 digital and 800 analog I/Os, more than 30 control loops, and Rockwell Software's RSView32 MMI package. Field instruments were implemented to measure and control temperature, pressure, flow, and level. Gas analyzers, on-line X-ray analyzers, closed circuit TV, and electro-mechanical actuators were also part of the solution.

A single operator can monitor and control the entire process from raw material crushing to cement grinding. The operator has access to all the process parameters, equipment on/off

status, system alarms, as well as log and trend data from a single location. Local control is provided by a control box with a start/stop button, mainly for maintenance purposes.

A kiln optimization software package was integrated with the instrumentation and control hardware. The software continuously monitors parameters such as kiln speed, cooler speed, raw material feed rate, rate of coal feed, hot air flow, temperatures at preheater and kiln, and differential pressures. The software takes corrective measures by adjusting the set points of feed rate, coal or hot air.

### Results

Rockwell Automation has been OCL India's sole consultant and supplier for all its automation needs since 1984. "For us, Rockwell Automation has always been a business partner rather than a supplier," says R. Pandey, Senior General manager, OCL India. "We believe Rockwell Automation has contributed to the profitable growth of OCL India in the last 17 years."

Implementation of the system and upgrades have always occurred

smoothly. The system has proven to be robust and reliable, without a single hardware or software failure since installation.

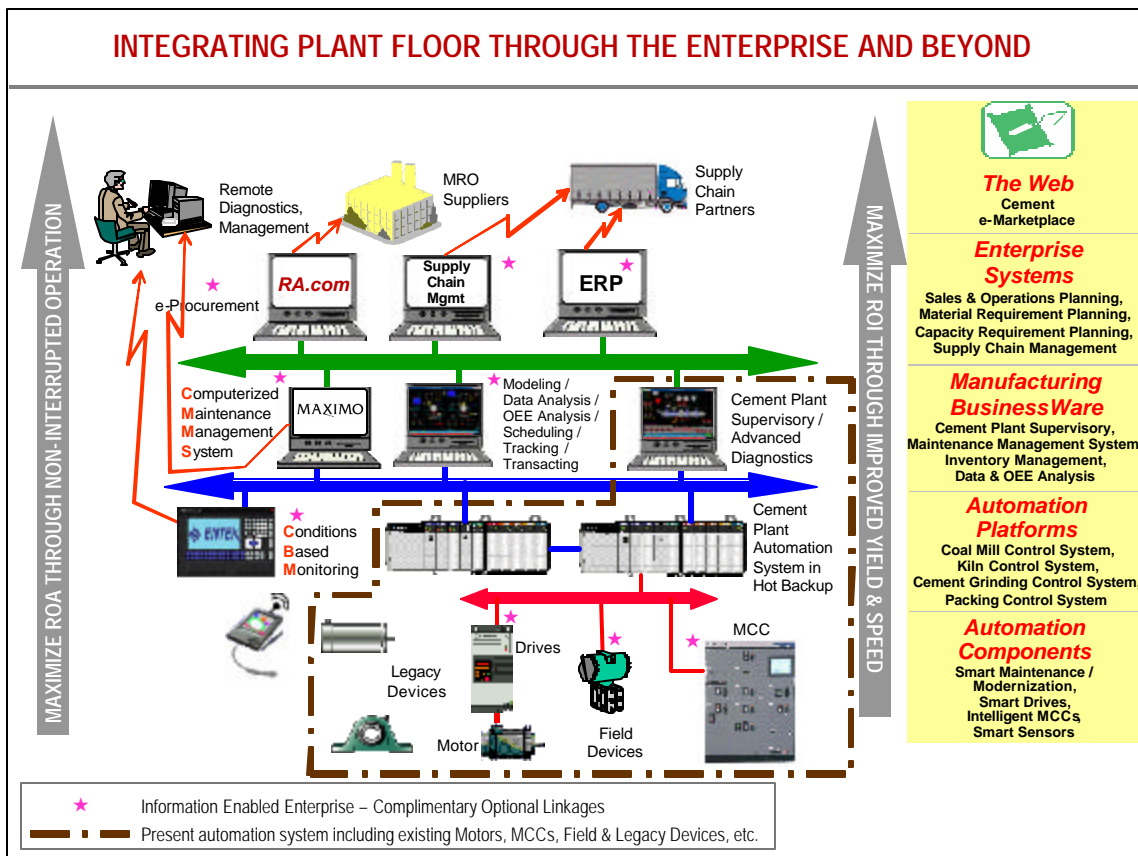
By fully automating the plant, OCL India was able to maximize capacity while stabilizing and optimizing operation and minimizing plant shutdowns. The automation system ensured that timely actions could be taken in response to disturbing parameters, which would not have been possible without automation.

OCL India reports that automation has contributed significantly to increases in production and revenue. Production has increased from 1,500 tons per day to 3,300 tons per day, while annual revenue has increased from US\$10 million to US\$25 million.

Automation has also helped the plant to significantly reduce specific power consumption. By being able to monitor actual power consumption, operators are able to optimize equipment usage resulting in more production per unit of power. Specific power usage has been reduced by 27%, from 110 units per ton to 80 units per ton.

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.

## INTEGRATING PLANT FLOOR THROUGH THE ENTERPRISE AND BEYOND



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