Golden Bay Cement Plant Generates Energy Savings with CBA® Technology

Project	Golden Bay Cement Plant
Owner	The Golden Bay Cement Co. LTD
Cement Supplier	GCP Applied Technologies
GCP Solution	CBA® Technology

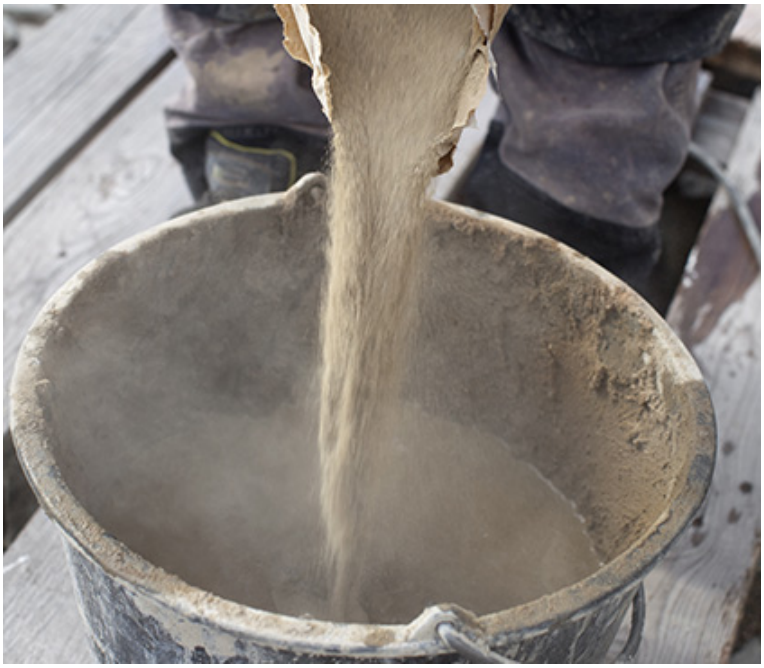
The Overview

The Project

In an increasingly challenging cement plant marketplace, the need to focus on manufacturing in an environmentally-friendly and cost-effective manner has become more and more critical, requiring innovative solutions.

Golden Bay Cement's Portland plant, located in northern New Zealand, represents an interesting case study in the cement and power industry's efforts to reduce costs and improve environmental performance in the cement manufacturing process. This cement plant, which supplies the New Zealand and South Pacific markets, has a production capacity of 500,000 tonnes per year. Cement is manufactured in a dry process GATX-Fuller conversion of a Vickers-designed kiln, a conversion, which was commissioned in 1983. Clinker is ground in three open-circuit mills.

"The Golden Bay Cement Plant experience is an interesting case in which a Quality Improver was used to reduce the Lime Saturation Factor while maintaining cement strength. This allowed the producers to reduce the ratio of high-grade limestone used and ultimately to lower production costs and energy consumption."



In responding to customer requests over a number of years for cement with superior performance characteristics, Golden Bay Cement pursued a strategy of progressively higher lime saturation factors.

Typically, a raw mix of 75% cement rock and 25% high-grade limestone was needed to produce clinker giving the required performance. A consequence of this particular mix of raw materials is a relatively high silica ratio of 4:1.

The high silica ratio indicates the potential for difficulties in processing a raw mix of this chemistry. The consequent high fuel consumption presented a technical challenge to plant personnel, as they tried to meet power industry business expectations for lower energy consumption and reduced production costs.

After thorough consideration of various options, the agreed strategy was to investigate modern cement additive technologies, which might allow enhancement of the performance of cement with a lower Lime Saturation Factor (LSF).

As part of the evaluation, both laboratory and plant trials were carried out by Golden Bay and GCP technical staff. This testing indicated that the CBA®line of quality improvers from GCP would be likely to provide the best strength enhancement of all the alternative additives evaluated.

The superior strength-enhancing properties of the CBA®type of Quality Improvers are linked to their ability to stay in the cement pore water over time, and to dissolve the ferrite phase in cement. The test of CBA®quality improvers indicated the possibility of using it to reduce the LSF of the clinker, potentially allowing the use of less costly raw materials, while still achieving higher strengths.

The cement produced during the Golden Bay Cement Plant trials showed an increase in mortar compressive strength (to AS/NZS 2350) from 58 MPa to 65 MPa. Parallel tests using a reference concrete mix showed an increase from 28-30 MPa to 32-34 MPa.

The final decision to use CBA®quality improvers was based on its demonstrated ability to deliver the required performance as well as to allow for future process enhancement.

The Final Results

Quality Improvers can provide an advantage to cement plants and the power industry. They can be used to produce a number of benefits, including: reduced mill retention time; increased substitution of clinker by limestone; increased cement production capacity for a given strength; increased flexibility in selection and handling of raw materials.

Reductions in greenhouse gas emissions and lower production costs were achieved by Golden Bay Cement Plant through the use of a CBA®Quality Improver from GCP. This enabled the cement plant to reduce the lime saturation factor in its clinker from 98 to 96 and then to 95 while maintaining cement strength. And in turn allowed for the increased use of a locally available, lower cost raw material and a reduction in clinkering temperature.

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