

High-Carbon Fly Ash in Cement Manufacturing – A Long Term Commercial Demonstration

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ABSTRACT

A long-term commercial trial demonstration was carried out at Illinois Cement Plant at LaSalle, involving the substitution of high-carbon fly ash in cement raw feed. Nearly 200 tons of fly ash was used at 3.5% addition by weight of the raw feed. The purpose of the demonstration was to evaluate benefits in the fuel usage, production rate, operation continuity, product quality, and emissions that might be achieved with high-carbon fly ash substitution. During the four-day demonstration, pertinent data was collected and a comprehensive material, fuel, and energy balance was carried out to determine the overall operational benefits. Cement produced during the demonstration was characterized and evaluated for compliance with the ASTM C 150 specifications.

The following benefits were realized as a result of using high-carbon fly ash in the cement raw feed; 1) fuel consumption was reduced by 2.6%, 2) NO_x emissions were reduced for the period when the ash was in use, 3) clinker production was marginally increased, 4) kiln operation was smooth and normal; no undue effects on operation were caused by the ash, and 5) cement strength increased by 5% at 28 days relative to the strength before and after the use of the ash.

The demonstration was a continuation of a series of commercial trials as an effort to implement the use of high-carbon fly ash at cement plants. It is anticipated that the demonstrated benefits will enable both the utilities and cement plants for joint ventures to ensure high volume consumption of the fly ash.