

WORLD CEMENT

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Phoenix Rising

Richard Skroski, Rexnord Industries, Inc., USA, describes the construction of a new Phoenix Cement plant on the site of an existing facility, and the variety of material handling equipment used to link together a system which moves materials through the process.

Introduction

To build a new plant on the site of an existing one while production continued was the challenge faced by Phoenix Cement as it upgraded production at its Clarkdale, Arizona facility by replacing all major systems other than the transportation system. Like its proverbial namesake that rose from its own ashes, the recently completed plant sprung from the original facility that was first constructed more than 40 years ago.

North of Phoenix

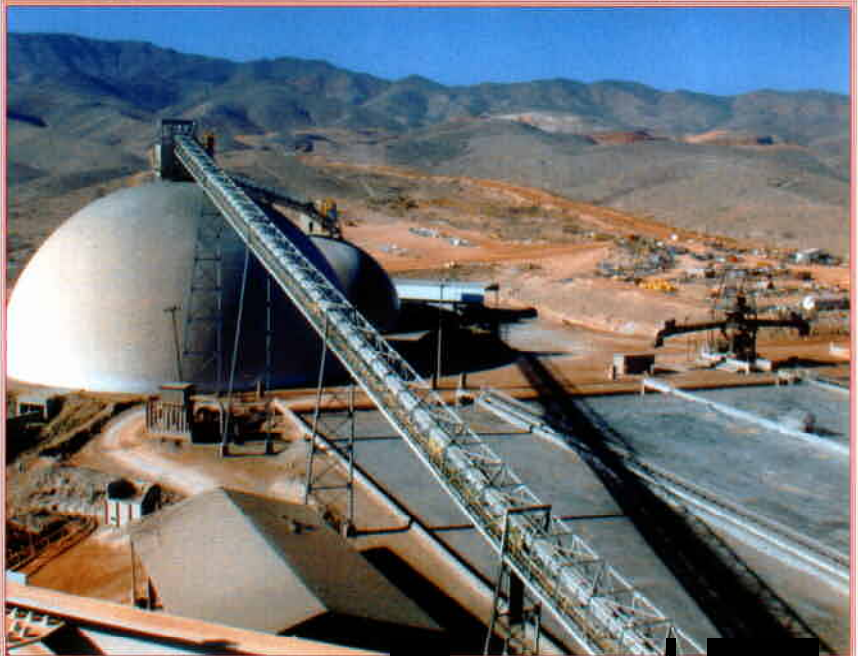
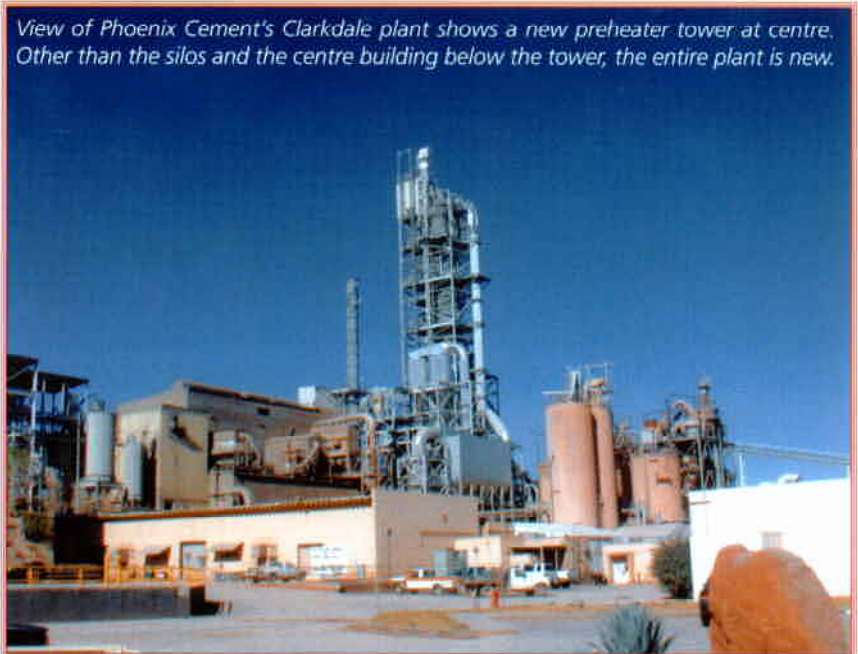
Located a few hours north of Phoenix itself, the Phoenix Cement plant was put into operation in 1959 to supply cement for the Glen Canyon Dam project near Page, Arizona. After that project was completed, the plant developed other business to utilise its 650 000 tpa capacity. The facility is a wholly owned subsidiary of the Salt River Pima-Maricopa Indian Community and now serves markets throughout Arizona, as well as Southern California, Nevada, and New Mexico.

Starting at an open-pit quarry approximately three miles from the plant, a fleet of 100 t haul trucks feeds the plant's primary crusher. Following further size reduction in a secondary crusher, the product is ground in the raw mill and blended before being processed through the kiln and finish mill.

Keeping ahead of competitive market conditions

In order for the plant to remain competitive in the marketplace, the firm saw a need for a major upgrade in production capacity and more efficient equipment technology. The result was what amounts to virtually a new plant, from vertical raw and finish mills to a single five-stage preheater-precaciner kiln system that replaces three older units. The project

View of Phoenix Cement's Clarkdale plant shows a new preheater tower at centre. Other than the silos and the centre building below the tower, the entire plant is new.



Because the plant's permit requires clinker to be covered, it is conveyed to and from this dome.

began in Spring, 2001, and took about 18 months to complete, although some details still are being fine-tuned.

Previously, the plant produced approximately



RexAFT pan conveyor and bucket elevator which handles clinker from the clinker cooler.

1800 tpd, using the three kilns, and design capacity is now 3000 tpd.

A tour of the plant reveals a new Fuller-designed vertical raw mill, an OK vertical finish mill. Several belt conveyors transport material between stages of production, but at the heart of the material handling system within the new plant are three Rex bucket elevators, four electrically operated pendulum gates, an AFT pan conveyor that handles clinker from the cooler and elevates it to a storage silo, several drag chain conveyors and apron feeders, all supplied by Rexnord Industries, Inc. Specifications of these units reveal a variety of sizes, capacities and capabilities. Here are some examples of how they function in the new plant.

Bucket elevators

Two Rex drag chain conveyors return oversize material that has been through the raw mill to the elevator, after which a Rex apron feeder sends it back to the mill for reprocessing. The bucket elevator operates on 89 ft 11 in. centres, carrying material with a 2 in. maximum lump size. Operational capacity of the elevator is 240 tph, and chain speed is 261 ft/min. The elevator is of dust-tight construction to help manage atmospheric conditions. Driving it is a 40 hp Reliance electric motor through a Rex Atlas-series Planetgear, connected by a Rex Omega E-30 split-in-half polyurethane coupling. A Reliance 5 hp motor and Mercury Planetgear power the inching drive.

Another elevator, in the clinker-handling area, is fed by a Rex AFT pan conveyor that carries clinker from the clinker cooler through a Rex gate. Here the material may pass through the elevator and to clinker

storage, or if its temperature is too high, the gate will divert it to outside storage and back through the clinker hot bin and vibrating feeder to clinker storage.

Because of the higher temperature of the clinker, the elevator is designed to handle temperatures up to 400° F and is also dust-tight. It measures just over 131 ft centre-to-centre and has a capacity of 190 tph, with a chain speed of 261 ft/min. A 50 hp Reliance motor provides the power through a Rex Omega E30 coupling and an Earth Series Rex Planetgear drive. The inching drive is a 5 hp Reliance motor, coupled with a Mercury Series Planetgear drive.

Elevator 360 carries limestone from belt conveyor BC 363 to belt conveyor BC 361. It measures approximately 126 ft on centres, with a capacity of 184 tph. Chain speed is 148 ft/min, driven by a Reliance 40 hp motor through a Rex Omega E-30 coupling and a Rex Polaris Planetgear main drive. The inching drive, as with the other elevators, uses a 5 hp Reliance motor and Mercury Planetgear, connected by a Rex Omega coupling. The elevator is also dust-tight and is rated for 212 °F (100 °C) service.

Drag chain conveyors and gates

Clinker is stored under a domed structure and returned for finish grinding via a series of belt conveyors and through a Rex diverter gate that directs it to either the new finish mill or one of the older mills that is still used for specialty grinding. The gates typically use an actuator to move the gate from one position to the other.

Rex drag chain conveyors are used in several applications. As noted earlier, two of these units are teamed up to return oversize material to the raw mill, one feeding the other because of a change in direction. One is a 20 in. wide 9 in. pitch inclined drag chain conveyor on 16 ft 6 in. centres. A Mars Planetgear drive transmits power from a 5 hp motor, connected by a Rex Omega E-4 coupling. The second conveyor is similar but longer, measuring 44 ft centre-to-centre. It incorporates an Atlas Planetgear, connected to a 10 hp Reliance motor through a Rex Omega E-5 coupling.

Apron feeders

Rex Apron Feeders handle several tasks at the new Phoenix Cement plant. A 48 in. wide apron feeder handles raw mill feed and is equipped with a drag flight spillage conveyor beneath to collect sticky material that adheres to the feeder and return it to the process. The apron feeder measures approximately 22 ft centre-to-centre, with a capacity of 410 tph. Powered by a 15 hp motor, it operates at 51.5 ft/min. and is driven through a Rex Atlas Planetgear and a Rex E-5 Omega coupling. The spillage conveyor operates at 30.2 ft/min. and handles 20 tph. It is powered by a 5 hp Reliance motor and a Rex S3 right-angle helical bevel reducer.

Together, these component pieces of equipment form a complete system that has helped improve the plant's productivity and efficiency. As Phoenix Cement moves ahead with final adjustments and modifications, output is expected to average close to 3300 tpd.

Rexnord
INDUSTRIAL CHAIN AND CONVEYOR

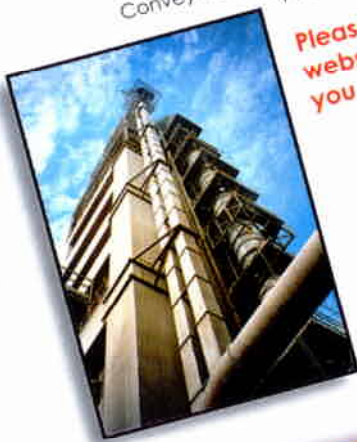
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