

River 7000 Project

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(written for *World Cement Magazine*, May 2008)

Introduction

Buzzi Unicem USA is a wholly owned subsidiary of Buzzi Unicem Spa, Italy. It operates nine cement plants, as well as one slag grinding facility, and produces approximately 9 million tpa of cement throughout the US, ranking the company fourth among US producers.

Background

In 1965, the Mississippi River Fuels Corporation commissioned the River cement plant in Festus, Missouri, some 35 miles south of St. Louis. The original plant was built on 3000 acres, produced 600,000 tpa of cement, and consisted of one long 16 ft. dia. x 560 ft. dry kiln with associated raw and finish grinding. In 1968, the plant capacity was doubled with the installation of an additional kiln line and grinding mills. The plant has operated with that configuration until the present time, manufacturing and distributing cement from St. Louis to Texas, of which 95% is shipped by barge on the Mississippi and connecting river systems.

The plant has seen several owners since it started in 1965. In 1979, the plant was sold to Unicem Spa and operated by RC Cement Co. Later, Unicem Spa was purchased by Buzzi Spa and is thus currently operated by Buzzi Unicem USA.

In the 1990s, the sales requirements for the plant began to outpace the production capacity, necessitating the importation of cement and distribution of it throughout the vast network that exists along the Mississippi River. In 2005, it was decided to increase the capacity of the existing plant, as well as to improve the operating efficiencies, thus eliminating the need to import cement while at the same time continuing to supply the company's valued customers with cement well in to the future.

Project Description

The new project, which was named River 7000, will produce 2.4 million tpa of cement by completing major modifications to the raw material storage, raw grinding, pyroprocessing, finish grinding, power distribution, automation, and barge loading areas. The plant was designed in a collaborative effort by Buzzi Spa Casale, Italy, Buzzi Unicem USA, KHD Humboldt Wedag, and Frucon Engineering. Great efforts were made to streamline the design while still maintaining the highest degree of reliability and operational flexibility. The company feels that the final design will accomplish this goal through the selection and layout of the attached equipment (Table 1).

The existing primary and secondary crushing system needs only minor modifications in order to handle the demands of the new plant and in the future will only grind limestone, which will be transported and stored in a new stacker/reclaimer building (Figure 1). An additional crusher/feeder will be installed in order to handle the other components of the raw mix, i.e., clay, iron, and sand, etc. A cross belt analyzer will be installed on the raw mill feed belt and will serve to control the raw mix in real time. The grinding of the raw materials will be accomplished with a Loesche 60.6 mill equipped with a redundant 6000 h.p. gear box and drive, which will allow easy replacement in the event of problems to the gearbox or drive. The unique "push-pull" arrangement of the drive will allow changing of the gear box in less than 24 hours.



Figure 1.



Figure 2.



Figure 3.



Figure 4.

Buzzi Unicem USA and Buzzi Spa, Italy. One major consideration during the procurement process was receipt of equipment in the largest possible size. Since the plant is located on the Mississippi River, the company wanted to use that to its advantage and eliminate as much site assembly as possible. The preheater vessels, ductwork, and any large fabrications were delivered by barge and offloaded into the plant. The dual string five-stage preheater was delivered to the plant in less than 60 pieces.

Detailed plant engineering for the main processing area of the plant was performed by Frucon Engineering, St. Louis, under contract to KHD, Atlanta, which was responsible for the integration of the

The preheater (Figure 2) and kiln were supplied by KHD Hukmboldt Wedag, Atlanta, and feature a five-stage precalciner with Pyrotop and extended riser duct designed for a 5 sec retention time. The preheater has been designed for 100% burning of petcoke. The fuel grinding plant was converted from direct to indirect in 2006 and will be utilized for the new plant. The clinker cooler has been supplied by IKN and will be equipped with a intermediate roll crusher. Both kiln and cooler exhaust gases will be treated in one common baghouse, which will be supplied by Redecam.

Finish grinding will be accomplished with two existing 4000 h. p. ball mills, as well as a new Loesche 6000 h. p. 53 3+3 (Figure 3). The new finish mill is equipped with the same gear box and drive as the raw mill. The major mill internals of both mills are common, thus maximizing the commonality of spare parts required for the plant.

The new plant will be supplied with 138 kV power supply versus the existing 34.5 kV, due to the increased load of the new plant. The plant's existing automation system will be replaced with the Siemens PCS7 system. All programming activities for this project will be accomplished in-house.

Although the plant is adding over 1 million tpa of production, it will accomplish this without the construction of additional storage by increasing the loading rate to barges to a rate of 1,000 tph, allowing the barges to be its new floating inventory. This required major modifications to the dock facility (Figure 4), as well as the installation of a 1000 tph tube conveyor. The new system will allow the extraction of cement from either the existing storage silos or the cement dome, individually or as a mixed stream from both.

Project Execution

Procurement of the major equipment and the general design for the plant was executed by

major equipment suppliers and all detailed engineering. All major contracts for the plant construction are being managed by the project team. The Midwest area of the US has been particularly busy over the last couple of years, creating a very competitive market for local labor. In order to control the costs and the schedule for construction, the project team has had to assume more responsibility for completion of the work than was originally anticipated.

Finish mill start up is planned for the spring/summer of this year and the balance of plant startup is scheduled for the end of this year. The project team has worked diligently to make this new plant one of the premier facilities in the world and the company is proud of their efforts.

Description	Supplier	Capacity	Type and Specification
Primary Crusher	Traylor/Fuller	1,090 tph	Gyratory crusher 54 in. dia.
Sec Crusher	Pennsylvania Crusher	990 tph	Impactor crusher 42 in. dia. rotor with scalping screen
Stacker/Reclaimer Limestone	Bedeschi	1,400/550 tph	Dome: 80 m dia. 28,000 t capacity, circular stacker/reclaimer
Reclaimer Clay	Bedeschi	15 – 150 tph	Dome: 39 m dia. 5,700 t capacity, circular pusher type reclaimer
Additive Crusher	Bedeschi	400 tph	Twin rollers crusher RL-850/2000
Cross Belt Analyzer	ThermoFisher		PGNAA – Cf 252 source Model CB OMNI-X
Raw Mill	Loesche	540 tph	Vertical Roller Mill LM 60.6 – 4600 kW motor
Raw Mill Fan	Boldrocchi	1.2 million m ³ /hr	Backward curved inclined, wheel 3250 mm dia. – 5200 kW motor
Kiln Feed System	KHD	7,100 tph	Two bucket elevators with weight scale
Preheater	KHD	7,100 tph	Two strings/five-stages with single low NOx precalciner
Preheater Fans	Boldrocchi	(2) x 572,200 m ³ /hr	Backward curved inclined, wheel 3590 mm dia. – motor 1900 kW
Kiln	KHD	7,100 tph	5.4 m dia. X 65 m length, two supports – motor 1120 kW
Clinker Cooler	IKN	7,100 tph	Pendelum type – two grates with middle roll crusher – loading 46t/m ² /day
Heat Exchanger	Redecam	680,200 m ³ /hr	Air to air heat exchanger – model 4-RF4x3-612 – area 6153 m ²
System Baghouse	Redecam	1.5 million m ³ /hr	Four modules, pulse jet dust collector 16DPL-27x13/4.56
System Fan	Boldrocchi	(2) x 812,230 m ³ /hr	Backward airfoil blade, wheel 2,400 mm dia. – motor 1900 kW
Finish Mill	Loesche	190 tph	Vertical Roller Mill LM 53.3+3C – motor 4600 kW
Finish Mill Fan	Boldrocchi	(1) x 800,000 m ³ /hr	Backward airfoil blade, wheel 2300 mm dia. – motor 2100 kW
Finish Bagfilter	Redecam	650,000 m ³ /hr	Four module, pulse jet dust collector 4PDH-72x10/3.93
Barge Tube Conveyor for Cement	Beumer	990 tph	400 mm dia. x 335 m long w/VFD – drive 160 kW