

REDUCING DOWNTIME

Bill Barraugh, Bricking Solutions, USA, describes a modern method for reducing downtime in lime kilns.

Introduction

Profit is lost every minute that a kiln is not turning. This is primarily due to the lack of efficient and safe methods of refractory tear out and installation. Lime kilns are particularly time-sensitive, often taking nearly three times as long as similar jobs in a cement kiln.

Manual demolition and installation of brick in lime kilns are largely to blame for these issues. With the extremely high temperatures and danger of falling debris, manual methods of tearout can create a dangerous work environment. Industry leaders, such as Bricking Solutions (a division of Pneumat-O-Ring International) and refrAK Bricking Systems, have developed modern techniques and equipment which can assist lime plants to maximise workplace safety, provide installation quality, and help to increase overall profit.

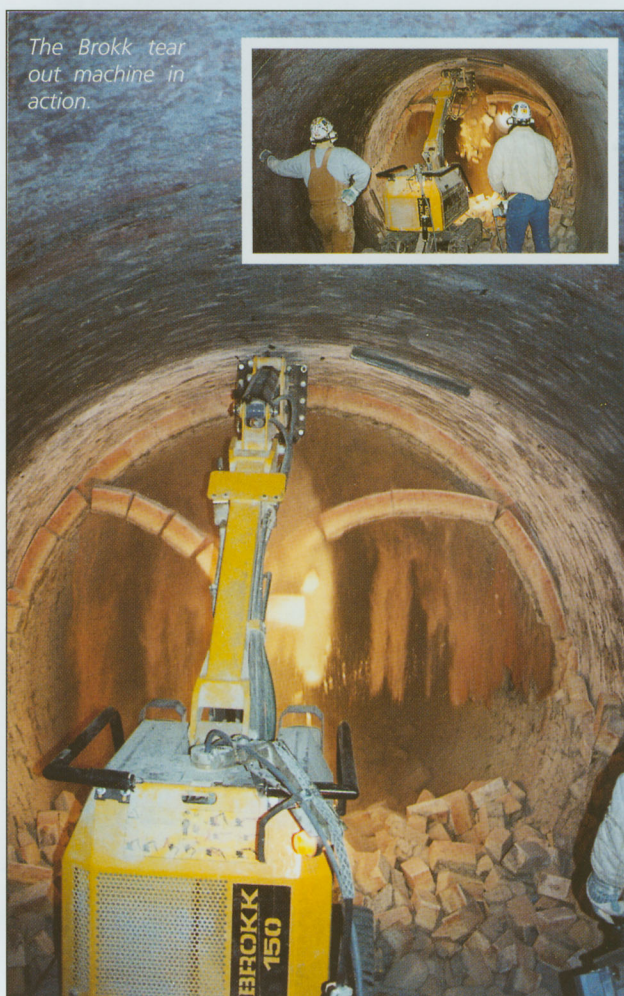
Modern methods

Ironically, very few lime kiln owners have implemented more current and efficient refractory maintenance tools and procedures. Pneumat-O-Ring (based in Monroe, WA, USA) and contractors such as refrAK Bricking Systems (of Los Angeles, Chile) use advanced brick tear out and installation technology to dramatically reduce down time, increase production and refractory life span, while improving workplace safety.

Case study

refrAK Bricking Systems worked with a plant in Chile (CMPC, Santa Fe) with a lime sludge kiln that had suffered severe problems of heavy ring formation in the upper part of the burning zone forcing repeated, unscheduled shutdowns. Using standard manual removal techniques it took approximately 120 hours for a complete tear out including removal of brick and coating.

In October 1998, the plant shut down its 3.35 m dia. x 81 m lime kiln and implemented technology by Pneumat-O-Ring and refrAK Bricking Systems, utilising bricking machines, demolition machines and related equipment to reduce the outage time. The tear out time was reduced to just 30 hours. Down from 120 hours, this new procedure increased profitable production time by 75%. The bricking machine further reduced the outage time by at least 96 hours.



For example 11 m of dual lining in the former chain zone was keyed completely in 14 hours (in one layer linings, the bricking machine with a trained team of masons can easily key 16 to 20 running m in 24 hours).

The lime kiln dam (610 mm over burning zone brickwork height), originally lined with low-cement castable over a baking lining in light-weight semi-insulating bricks, was replaced with a 90 mm lower dam. 8 m of burning zone brickwork was replaced and the burning zone was extended by 5 m. Several metres of the intermediate and drying zone were repaired and a new flash drier was installed. Breaking up the concrete and replacing it with bricks eliminated the chain zone.

The concrete was demolished by the Brokk demolition robot, a remote controlled demolition machine which has been used to maximise efficiency in plants worldwide. With manual demolition it is often neces-

REFRAK BRICKING SYSTEMS

refrAK Bricking Systems' owner Anders Karlgren has been installing bricks and solving problems in rotary kilns since 1974. He has installed over 7000 m of brick in over 79 kilns. The company specialises in rotary kilns and provides complete bricking systems including problem solving, robotic tear out and mechanical installation. One example of Anders' problem solving capabilities is the reduction of one cement plant's refractory consumption per ton of clinker to below 330 g/t of clinker.

BRICKING SOLUTIONS

Pneumat-O-Ring International recently changed its name to Bricking Solutions to more accurately reflect its commitment to not only provide the most advanced bricking machines in the industry but to also provide solutions to any brick installation problem. The company has delivered over 650 bricking machines and support equipment to more than 61 countries in the past 32 years.



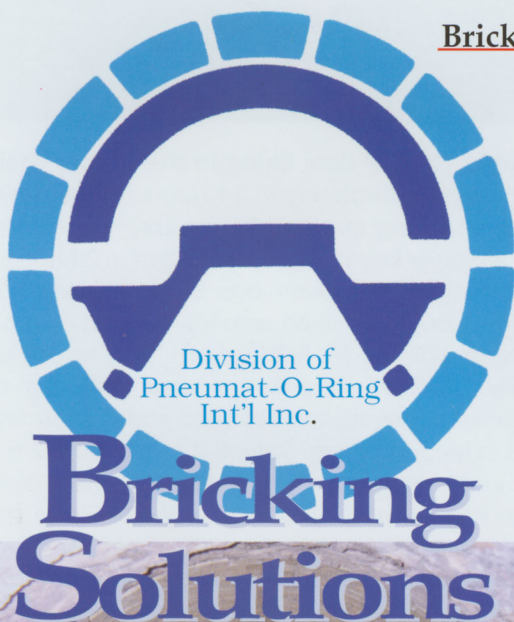
The Bricking Solutions' bricking machine in operation at the CMPC plant, Chile.

sary to wait nearly 30 hours until a kiln has cooled down sufficiently to begin work. In kilns that suffer a heavy coating, very high temperatures will be retained for a longer period, especially if the kiln is lined with insulating backing tiles. Equipped with a remote control, the Brokk tear out machine begins removing heavy coating as soon as the intermittent rotation of the kiln is complete.

After demolishing the coating, the dam and remaining burning zone lining was quickly torn down by the robot. The lower part of the burning zone was installed using the bricking machine, which was designed to reduce downtime cost through its ease and speed of operation, safety and quality. The rig consists of a mobile working platform to support a pallet of bricks, the men working on it and two half circle aluminum centres equipped with air cylinders to place the brick. The dual arches with cylinders not only allow the accurate and speedy placement of brick, but also allow the masons to work on two rings at the same time.

The Brokk robot continued further up the kiln in the drying and ex-chain zones breaking up 40 m of extremely heavy coating, chains and 10 m of an old metallic lifter system. This was coordinated with the installation of the flash drier. Once the burning zone lining was keyed, the kiln was turned (installation of the dam lining was made of concrete and required turning the kiln), the dam and the drying zone lining were installed. The bricking machine enabled the masons to easily key 16-20 m in 24 hours. Use of these methods reduced the downtime by 186 hours.

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