

## RESCOMAG® 85 Lowers Shell Temperatures in a Cement Kiln

Last spring, a Midwest cement operator installed a 220-mm lining of RESCOMAG® 85 in the upper burning zone of a 12' diameter cement kiln. The objective was to evaluate the insulating value of this product. The results are shown in figure 1.

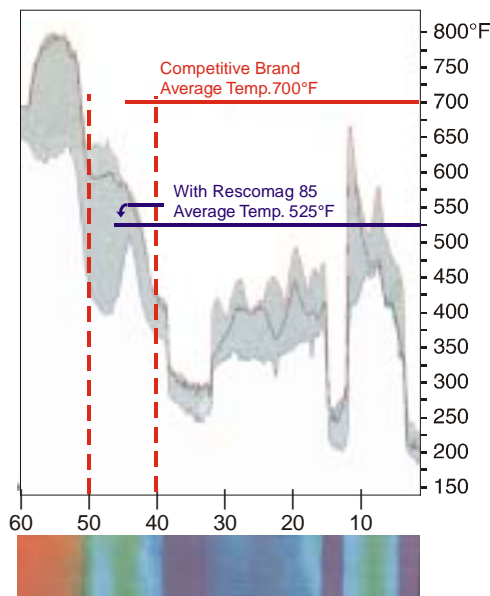
Overall shell temperatures look to be reduced by approximately 175°F in comparison to both the adjacent refractory and the preceding brick.

Magnesia-spinel refractories are generally binary combinations of dead-burned magnesia (MgO) and magnesia-alumina spinel. The primary component (most of what's in the brick) is the dead-burned magnesia, abbreviated magnesite, and this component generally establishes the product's refractoriness and chemical resistance. It is the spinel component, however, that adds the insulating value and serves as a shock absorber to give the composition good resistance to thermal shock.

RESCOMAG® 85 is composed of synthetic, sintered magnesia and fused magnesia-alumina spinel. The high content of spinel gives RESCOMAG® 85 improved thermal conductivity in relation to many other spinel brick.

Typical uses of RESCOMAG® 85 in cement kilns include upper transition zone linings especially where shell temperatures are a concern. Many operators continue to use 85% MgO refractories in lower transition zones where liquid phase attack is not particularly severe. Rotary lime kilns, including lime recovery kilns in the paper industry, also use RESCOMAG® 85 in all areas of the burning zone where low shell temperatures and good chemical resistance are desired.

Figure 1



## Higher MgO Brands Improve Service in Problem Lower Transition Zones

A primary wear mechanism in the lower transition zone is infiltration and erosion of the refractory by the cement clinker liquid phase. Some recent laboratory rotary drum furnace erosion studies implied that the resistance of a magnesia-spinel brick to corrosion by a cement clinker improved with lower alumina (lower spinel) content. Magnesia-alumina spinel is the more soluble component in the clinker liquids.

This lab work supports our observations that higher magnesia-content spinel brick tend to perform better in troublesome lower transition zones. Two high magnesia brands Resco offers for this service are RESCOMAG® 92 and RESCOMAG® 92 FMS.

RESCOMAG® 92 is composed of the same high purity dead-burned magnesia as in RESCOMAG® 85, but contains about half the amount of fused magnesia-alumina spinel. RESCOMAG® 92 has exhibited better performance in problem lower transition zones than 85% MgO spinel brick.

RESCOMAG® 92 FMS is an improvement of RESCOMAG® 92 utilizing a very high content of fused grains. Fused refractory grains are more resistant (less soluble) to melts at elevated temperatures. RESCOMAG® 92 FMS is useful for lower transitions that see severe liquid phase attack as well as corrosion from sulfur and chlorine compounds



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## New Castable for High Abrasive Wear Applications

R-MAX® C is a cement-bonded castable that was developed by Resco for extreme abrasion applications. Intended initially for petrochemical applications to resist the abrasion of a fine alumina catalyst, R-MAX® C exhibits physical properties that make it very desirable for rotary kiln applications.

With compressive strengths exceeding 20,000 psi, R-MAX® C not only yields exceptional abrasion resistance (less than 4 cc loss in the ASTM C-704 abrasion test after heating at 1500°F, see figure 2), it also has high impact resistance.

With over 70% alumina content, and a 3200°F service temperature limit, R-MAX® C is useful in a variety of rotary kiln applications.



Figure 2: C-704 abrasion plates show that R-MAX® C (left) has less than half the abrasion loss of typical low cement castable (right).

R-MAX® C has already demonstrated exceptional performance in cement kiln planetary cooler ports and elbows, two very abrasive applications. R-MAX® C can provide the high strength required for clinker cooler bull noses. Feed ends of pebble lime kilns are also applications for this product. R-MAX® C can be conventionally cast with immersion vibration, pumped and applied by the wet shotcrete method.

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## New QUIKTURN™ Product Available Now

KRICON® 32-70 XR is a well-known, versatile low-cement castable product used in rotary kiln nose rings, burner pipes and certain areas of cement and lime kilns. Combining the technologies of KRICON® 32-70 XR and Resco's successful QUIKTURN™ product line, Resco has developed QUIKTURN™ 32-70, a 77% alumina, 3200°F low-cement castable useful for those applications where the cure and dry-out cannot be controlled.

QUIKTURN™ castables are specially designed to be brought into service using process generated heat. Watch our new website for bulletins on this product ([www.rescoproducts.com](http://www.rescoproducts.com)).

## Editor's Corner

Over the 30 years that I have been working with rotary kilns and their refractories, I have seen a lot of improvement in kiln processes, maintenance practices and certainly, refractory technology. The general trend over these three decades is that rotary kilns typically operate longer. When I started working in 1973, there were over 400 cement kilns in operation. Today, less than half that number are turning.



In 1973, it was common practice for cement plant workers to perform the refractory repairs, principally the brickwork. Some large multi-kiln plants even had their own masonry department. Masonry crews sharpened their skill levels by installing brick often. Now with fewer kilns operating and refractory lasting longer, it is difficult to maintain the skill level of a rotary kiln plant's brick crew. To complicate matters, the kilns are larger, are turning much faster, and, yes, are also beginning to show their age. The margin for error is much smaller.

But ultimately the quality of the installation is determined by the skill of the workers. Aggressive training of bricklayers is a potential solution. Close observation by trained inspectors is another, and supervision of the brick job becomes critical. Finally, using skilled, professional installers is the option that many plants have chosen.

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