

The RefractoryBEAT

Inaugural Issue

Dalmia OCL

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If You Have A Coating Problem

As someone seasoned in running cement kilns can tell you, unwanted coatings and build-up of rings is a commonly-occurring problem that reduces refractory life and kiln efficiency. Often it also leads to alkali and sulphur infiltration, especially in a few critical zones of the kiln such as the burning zone, upper transition zone and calcination zone. All this has just one unwanted outcome - increased production costs and even kiln downtime in extreme cases.

Till date kiln managers in India had to depend on imported Silicon-Carbide (SiC) bricks to protect themselves against coatings and ring build-up. However, a recent introduction of special quality bricks called DALCR from Dalmia-OCL is just the relief any kiln manager would have wished for.

These anti-coating high-alumina bricks contain SiC ranging from 5% to 25%. The SiC converts to Silica to form a glassy surface to resist, repel and minimise nasty coatings and ring build-ups. What's more, even if coating

UNIQUE FEATURES

- High-pure chemical properties with different proportions of SiC
- Low porosity, permeability and high CCS
- High Refractoriness Under Load (RUL)
- Excellent spalling resistance

comes from process, it gets easily dislodged.

Advantage DALCR

First and foremost these are locally-made at Dalmia-OCL's plants in Dalmiapuram (TN) and Khambalia (GJ). Which means savings in foreign exchange and downtime. Reduced waiting periods also mean speedier trials and production managers no longer need to keep inventory to defend against availability or delays in incoming foreign shipments.

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From the CEO's desk



Dear Partner,

It gives me great pleasure to present to you, The Refractory Beat, your window into the world of Dalmia-OCL.

Dalmia Refractories has been proudly serving the cement industry for over six decades now. We are the only refractory company who supports almost every cement plant in India to get the best output from their kilns. Our product range spanning across alumina bricks, basic bricks and castables, is the widest and is continuously updated to deal with changing production practices.

Today, Dalmia-OCL is the brand representative of the Refractories business of the INR 10,000 crore Dalmia Bharat Group. Our facilities span four raw material mines, four manufacturing plants in India, one in China along with a specialised refractory R&D Centre. This spread helps us cater to multiple segments spanning Iron & Steel, Glass, Non-Ferrous Metals, Power & Petrochemicals, aside from Cement. With 5,000+ man-years of diverse, rich and proven refractory experience, you will find in Dalmia-OCL an already dependable and responsive partner, now stronger in technical and delivery capabilities for your unique needs.

The Refractory Beat is a step in the direction of strengthening our relationship with you. I see it as a great platform to share what's new at our end and how it could mean 'more' to you and your business as it evolves. Coupled with the technical meets that our teams organise at your locations, this direct platform will allow us to share with you what goes on behind-the-scenes to create bricks, monolithics and solutions that have helped us stay ahead of competition in many areas, for the longest time.

I hope you will enjoy The Refractory Beat as much as the team enjoyed putting it together. Do share what you liked and what you didn't. Email your feedback, comments and suggestions to ceo.refractories@DalmiaOCL.com. I'm looking forward to hearing your views.

Warm regards,

Sameer Nagpal

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In addition to minimising coating and ring build-up, DALCR has demonstrated:

- Excellent abrasion resistance
- Ability to withstand severe thermal fluctuations
- High thermal & load bearing capability

What's more, the anti-coating properties and chemical inertness of DALCR make it an ideal choice especially for kilns which are alternate-fuel fired.

DALCR - recent successes

Last year, Dalmia-OCL conducted trials of DALCR 60 bricks in kilns in Rajasthan & Madhya Pradesh, in plants of India's two leading cement manufacturers.

Rajasthan trials

Since 2015, indigenous DALCR bricks are being used from 38M to 48M area in these kilns. During an annual shutdown in October 2017, the said area was inspected by a team comprising members from both Dalmia-OCL and the customer. The team concluded that the bricks were suitable for another campaign basis residual thickness measurements they recorded. The lining was therefore allowed to remain.

Madhya Pradesh trials

The purpose of this trial was to observe



Length	Thickness (mm)
38-39	220
39-40	190
40-41	190
41-42	200
42-43	200
43-44	200
44-45	220
45-46	200
46-47	190
47-48	170

performance of DALCR in 38M-48M area of the kiln. At the end of the first year, the team recorded the residual thickness of installed bricks during the annual shutdown. And basis the measurements recorded (see table above), it was decided that the lin-

Report snapshot

Used brick sample (length 210 mm) collected from debri for testing



Properties		Hot Face	Middle Portion	Cold Face
Apparent Porosity	%	7.4	10.4	14.1
Bulk Density	g/cc	2.67	2.66	2.57

Key observations:
No cracks or alkali spalling. Alkali salt infiltration found up to 75 mm from hot face resulting in reduction of AP (Apparent Porosity). Bulk density measurements show no threat of alkali spalling. Chemical analysis confirms adequate presence of SiC in cut surfaces for an additional campaign life of >1 year.

ing should be continued with as the bricks were in perfect shape (pun intended) for the next campaign.

implying that coating-resisting properties of the bricks were unimpaired. Chemical analysis showed that about 13.5% SiC still remained in the hot face, and about 2%-3% SiC turned into a glassy phase to impart coating-resisting property to the hot face.

At the time of performance assessment, SiC grains were clearly visible on brick surface

To learn more about DALCR, email us at Comms@DalmiaOCL.com or call Sobhit on 9810480520 today.

Dalmia-OCL participates in Ambuja Cement's skill development workshop

Members of Dalmia-OCL's Cement BU were invited by Ambuja Cement Limited (ACL) to speak at a three-day skill development workshop organised at ACL's Bhatapara plant. ACL's workshop is a regular event, where refractory experts interact with ACL's application team comprising over 20 application supervisors and mid-level managers from manufacturing plants spread all across India.

Mr Selva Muthukumar and Mr Bhavesh Nigam represented Dalmia-OCL and made technical presentations on installation techniques for Alumina refractories. As part of their interactive discussions, they also shared details about Dalmia-OCL's recently launched products, services and solutions, that had potential to boost ACL's kiln performance.



Dalmia-OCL shines at the 15th NCB International Seminar

It was a time for superlatives when India's leading cement refractory company showed up at the country's largest exhibition on Cement and Building Materials attracting a steady stream of India's who's who of cement companies.

lam, JK, Gujarat Sidhee, My Home Cements and other distinguished companies. Sumanta Mukhopadhyay, General Manager - Technical, presented a paper on 'Optimisation of Kiln Lining for Energy Efficiency' which elicited energised interest from the audience and was well-appreciated.

Dalmia-OCL's Cement BU Sales team was present in full strength and interacted with senior representatives from Ambuja, Manga-



How To Gain Energy Efficiency Without Losing Lining Performance

By Sumanta Mukhopadhyay



One of the most effective refractory management tools to achieve energy efficiency in rotary kilns today is optimisation of kiln lining. Optimisation as a process deals with reduction of energy losses through kiln shell radiation without impacting lining performance.

To implement the concept of kiln lining optimisation, great care needs to be taken on various process, mechanical condition and refractory related factors of the kiln. Critical areas of the kiln are identified and classified both in terms of importance towards affecting lining life and importance towards controlling radiation losses. Based on findings suitable measures are taken towards optimisation of kiln lining without compromising on

safety factors for critical areas to reduce energy losses. Wherever possible, lining of higher thermal conductivity is replaced with lining of lower thermal conductivity with a view to reduce the overall shell temperature of the kiln. Special quality bricks with improved thermal properties have been developed for burning, upper transition, safety and calcining zones of highly thermally loaded kilns which help us to implement optimisation concept.

Substantial energy savings could be obtained when highly radiation prone areas like upper and lower transition zones of the kiln are lined with refractories of suitable quality which bring down shell temperatures without compromising on lining life. In one of our recent case studies, there is an average reduction in kiln shell temperature by 50°C in 15M - 40M area from outlet where basic bricks of higher thermal conductivity have been replaced with special bricks of lower thermal conductivity. This will result in annual savings of up to Rs 25 lakh on fuel.

Continuous process of evaluation and optimisation helps in reducing energy losses and substantial savings could be gained in terms of reduced fuel cost and an environment friendly output. Email us at Comms@DalmiaOCL.com to learn more about Refractory Optimisation services and how your kiln could benefit from it.

Optimisation is a continuous process. Our next goal for this plant is to improve energy efficiency in 60M to 75M area from outlet by replacing 40% Alumina bricks with special-quality low Alumina bricks which have

Investigation of criticality of process conditions, lining history and mechanical conditions of kiln

PROCESS STUDY

REFRACTORY OPTIMISATION

A CONTINUOUS PROCESS OF INNOVATION, EVALUATION & IMPLEMENTATION

WEAR ANALYSIS

Post-mortem investigation allows to evaluate most critical factors influencing performance

OPTIMISED LINING RECOMMENDATION

Based on findings an Optimised Lining Recommendation is developed

INSTALLATION

Installation supervision to ensure proper implementation of recommendation

Advanced Energy Efficient Solutions from Dalmia-OCL

We all know that cement kilns lose substantial energy through radiation losses from kiln shell. Significant energy savings are possible through judicious selection of refractories with an aim to reduce shell temperature, without compromising on lining quality in critical areas of the kiln.

For instance, if the average shell temperature of a kiln with 4.75M diameter and 75M length could be reduced by 40°C; it results in savings of up to 860,000 Kcal/Hr. In terms of fuel alone this means savings of about 100 Kg of pet coke per hour or reduction in fuel costs by about Rs 62 lakh per annum.

Dalmia-OCL's Cement BU has been working in three different areas to arrive at solutions related to shell temperature reduction:

1) **Optimised kiln lining concept** – This concept assesses the criticality of usage condition and based on the findings, replaces

highly conductive basic bricks in relatively non-critical zones with special quality alumina bricks without compromising on lining performance.

Dalmia-OCL has a range of special alumina bricks like DALBURN, DALSUPREME etc. which are made with special additives to achieve desired properties and they are suitable replacement for basic bricks. DALBURN is suitable for burning and upper transition zones of kilns with pet coke firing and DALSUPREME is suitable for upper transition zones of kilns with higher thermal load.

2) **Development of low conductivity basic bricks**
Dalmia-OCL has developed basic bricks with special additives like ZrO₂ with enhanced thermal properties and reduced thermal conductivity.

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Gunning vs. Shotcreting

Kiln managers are constantly looking at ways to ensure minimum downtime for their kilns. Which is why a gradual shift is being observed in cement industry from conventional casting method to towards gunning and shotcreting. Forms or moulds are not required and since the castable is compacted by impact, there are savings in time and effort for ramming and compaction etc. The most amazing bit is that gunning and shotcreting enable hot repair work on refractory lining while the lining is in service.

Quick comparison

Gunning is generally associated with dust generation and rebound losses which sometimes cause higher consumption of refractory material since the rebound material could not be reused. Shotcreting however takes care of this problem. Some of the notable differences between the two are given in the adjacent table.

Dalmia-OCL too now provides end-to-end gunning and shotcreting solutions all across India. Call Sobhit at **9810480520** or email **Comms@DalmiaOCL.com** for details.

Gunning	Shotcreting
Usually standard refractory castables are used	Refractory castables are used in deflocculated or suspended form
Rotor or two chamber machines are used	Paddle mixers are necessary for mixing with water and to achieve required consistency in the castable
Dry castable is transported by compressed air to nozzle	Double piston pump transports the castable to nozzle
Mixing liquid like water is injected and castable is ejected towards application area	Compressed air and accelerator for solidification are injected at the nozzle
Mix hits the service location, gets compacted by impact and solidifies normally	Mix solidifies under the influence of additive or accelerator so solidification is controlled
Rebound is strong and results in dust generation	Rebound is mild and no dust generation
Standard properties are obtained	Improved properties are achieved

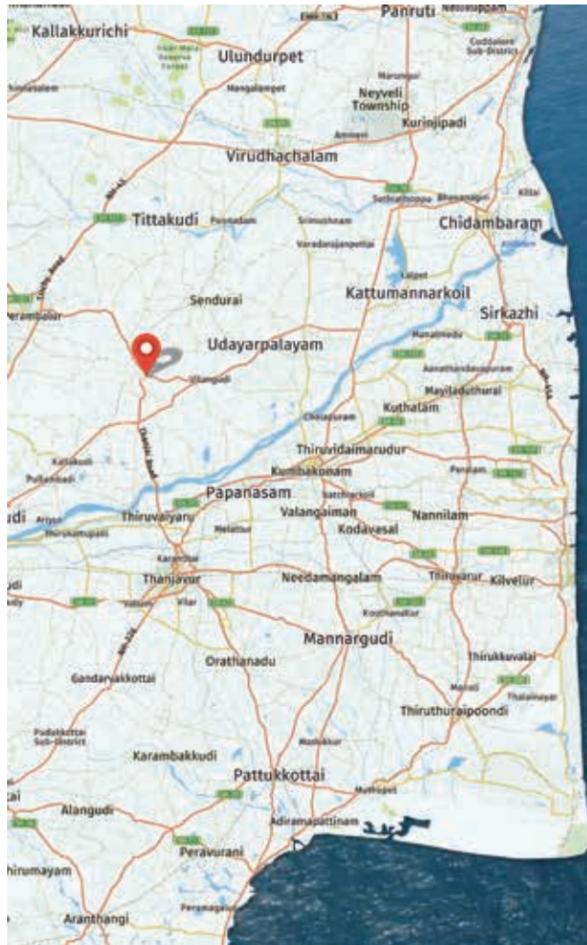
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These bricks are suitable in reducing radiation losses in critical areas like upper and lower transition zones of cement kilns under pet coke and alternative fuel firing. Thermal conductivity of these special quality basic bricks could be as low as 2.5 W/mK as against average conductivity of 3 W/mK for a normal Magnesia-Alumina spinel basic brick.

3) Development of ALITE - ALITE brick with very low thermal conductivity has been developed for inlet and calcining zone of kilns.

Apart from low thermal conductivity, these bricks have high resistance to alkali and sulphur attack, good cold crushing strength and low density which helps in reducing total refractory load in the kiln. On an average up to 75°C reduction in temperature is achieved by using Alite bricks as against 40% alumina bricks.

A careful combination of the above three approaches helps reduce radiation losses in kiln shell and results in substantial fuel savings. In fact, Dalmia-OCL's technical group is now trained and equipped to provide all possible assistance to its customers in creating a tailor-made solution suitable for their kiln. For more information, email **Comms@DalmiaOCL** today.



Performance Report

Product:	MAGNEL 85
Kiln location:	DCBL Ariyalur
Area of installation:	2.4 M to 6 M in the outlet
Previous lining life in this area:	3-4 months with 70% Alumina bricks
Installed in:	May 2016

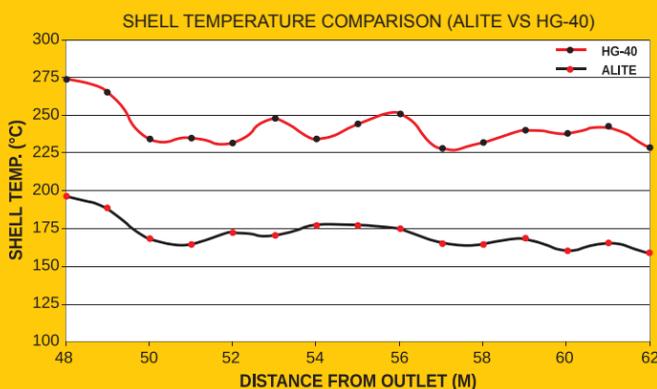
Result:
During a recent inspection, it was found that Magnel 85 bricks still have sufficient residual thickness for one more campaign. DCBL has decided to extend the basic brick area during their next shutdown in this kiln.



Comparison between Dalmia-OCL's Magnel 85 and bricks imported from competitor's plant in China

Magnel 85	Competitive Offering
Crack-free	Crack-free
Tolerance of ±1 mm	Tolerance of ±1 mm
Uniform colour	Variations in colour
No patchmarks	Patchmarks
No edge defects	Rough edges

Now Reduce Your Fuel Costs With The All-New Alite



ALITE is a high-strength Low-Alumina energy-saving brick which not only withstands abrasion from kiln feed for a longer campaign life, but also reduces thermal energy losses. Specially developed for calcination & inlet zones (0-15 M), ALITE has excellent Alkali and Sulphur resistance properties. Compared to denser 40% Al₂O₃ bricks, ALITE is nearly 45% more effective in controlling radiation losses. The best part is, with fuel cost savings it pays back for itself in under 3 months.

