

# Assured Performance of Pre-Cast - Pre-Fired Solutions

- Dr. Saumen Sinha, Alok Nagar, Rajeev Kumar Laharia, R. Chokkar  
Calderys India Refractories Limited

## Introduction:

All Cement manufactures always showcase efforts to achieve ideal kiln operational condition i.e. one shutdown in a year. Targeting for more refractory life in the critical areas of cement plant, enables to meet the objective. Refractory relining is time taking, hence maximising the refractory performance in any areas would provide financial benefits along with mental/operational satisfaction.

Most of the cement plants use a substantial volume of refractory during a shutdown, which calls for huge workforce deployment during installation. Safety concerns over the temporary manpower engaged during a shutdown are of paramount importance today.

Refractory Shutdown de-stabilises cement kiln operation, so avoiding production interruption is one of the major targets for cement manufacturers today. There are many instances, where unproductive hours were greater than the actual shutdown duration. Unplanned refractory shutdown not only reduces production, impacts profitability but also increases refractory cost.

Few Critical areas of a cement plant like Tip casting (Nose Ring) and Cooler Beam (Bull nose) are very sensitive.

Tip casting (TC) is exposed to the

- very high clinker abrasion,
- thermal shock due to unstable coating and
- Severe mechanical stress due to kiln rotation, 1<sup>st</sup> tire migration and bolting system of metal blocks.

Normally bricks are being used in TC and they are matched with the performance of burning zone bricks lining performance. **This is an ideal condition.** Over a period of time, due to outlet shell ovality/bell mouth, there arises a difference in hole positions and various issues of tip casting metal blocks (sector plates), resulting in misalignment of the outlet ring. This results in a reduction of tip casting refractory performance. The position of a metal retainer ring and its design also plays a very important role in the performance of bricks used in Tip casting.

To overcome this situation, most of the cement plants started using various grades of castable (Monolithic Lining). The dismantling of castable and relining it with new castable takes approx. 2-3 days more than that it takes for the brick lining. Utmost precaution during castable installation and controlled dryout of refractories area prime requirement for castable lining performance. Matching the performance of Castable lining in Tip casting with other areas of kiln lining is always a challenge for cement kilns and normally extends the downtime.

Moreover, damage of small portion of brick lining or failure of castable lining in few Tip casting panels leads to total shutdown of the plant and wastage of minimum 4-5 days with an additional cost of 15-20 Lacs (only refractory cost/ stoppage).

The Cooler Beam (Bull Nose) is exposed to

- Very High clinker dust abrasion
- High Temperature



Fig 1: Tip Casting Monolithic after use

Heat accumulation and more height of clinker bed (for heat recovery) damage refractory in Cooler Bull nose. The Shape of a bull nose and its position etc. are also responsible for its poor performance.

## Assured Solution – Calde Ready Shapes

NG Johnson (Northern) Ltd, UK, was a pioneer in providing refractory ready shape solutions for cement plant critical areas. Acquisition of N G Johnson by Calderys has provided access to this advanced technology for TC and BN.

At present, these blocks are being manufactured at Calderys Nagpur Works. Calderys provides tailor-made pre-cast-pre-fired solutions for

## TECHNICAL FEATURE

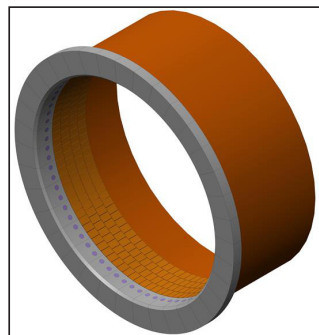


*Fig 2: Schematic view of TC block (CALDE RDS TC)*

(Very good strength, abrasion resistance and thermal spalling resistance)

- Tip Casting (Nose Ring)
- Cooler Bullnose (Beam)

These blocks are being manufactured with very high-grade special castable and state of the art manufacturing technology to ensure superior and reliable performance



*Fig 3: Schematic view of TC block assembly in Kiln*

### User List (TC Block):

- Hanson UK Heidelberg Cement Group - Ketton Works > 18 month
- Hanson UK Heidelberg Cement Group - Padeswood Works > 18 month
- Hanson UK Heidelberg Cement Group - Ribblesdale Works > 18 month
- CRB (Formerly Lafarge) - Dunbar Cement Plant > 18 month

**Table – 1**

	Bull Nose (BN)	Tip Casting (TC)
Kiln Size (TPD)	7000	10000
Fuel	50% pet coke	60% Pet coke, 5% AFM
Castable quality	SUPRAMON HS	ACCMON CRC
Performance (Actual)	12 Months	12 Months
PCPF Quality	CALDE RDS BN	CALDE RDS TC
Performance Expectation with <b>Calde Ready Shapes</b>	<b>24* Months</b>	<b>18* Months</b>

\*Varies from Plant to plant with other operating parameters

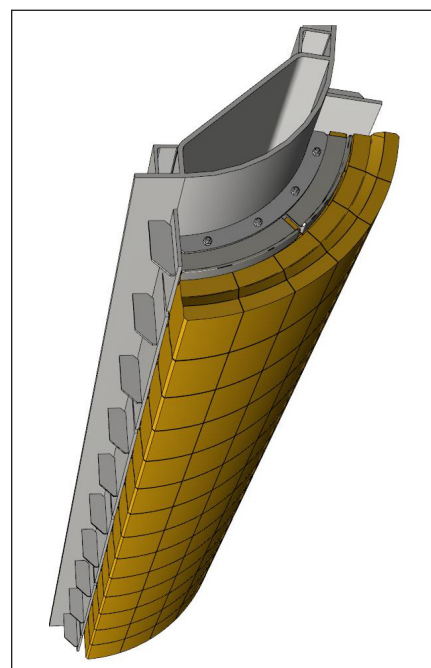
### Benefits:

- Safe and Reliable Installation
- Installation time reduced by 50%
- Castable hardening/Dry out time is not required
- Easy repair, an option of changing only damage portion
- Reduce specific cost
- For TC, separate steel casting blocks not required

The performance of various grades of castables installed in some of the cement plants at Cooler Bull Nose, Kiln Tip Casting are indicated in **Table I**.

### Conclusion

It is evident from the present user that



*Fig 4: Schematic view of BN block assembly in Kiln*

use of ready shapes provides immense benefit and improved performance (almost double the existing performance). These shapes are easy to use within least possible time.

Manufacturing of Calde Ready Shape blocks in controlled condition with state of the art technology would ensure its superior performance

These blocks would help in the reduction of an unplanned shutdown and also control the cost of refractory as it is already established in overseas.