



National Council for Cement and Building Materials

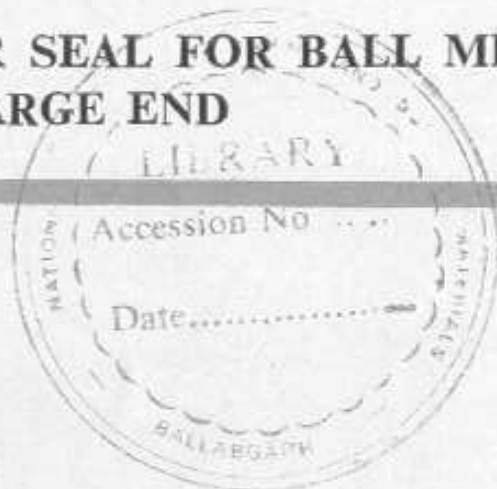
NCB's IMPROVED  
AIR SEAL FOR  
BALL MILL  
DISCHARGE END

Vol 3 No 8

JULY 1989

NCB       
TECHNOLOGY  
   DIGEST

## NCB's IMPROVED AIR SEAL FOR BALL MILL DISCHARGE END



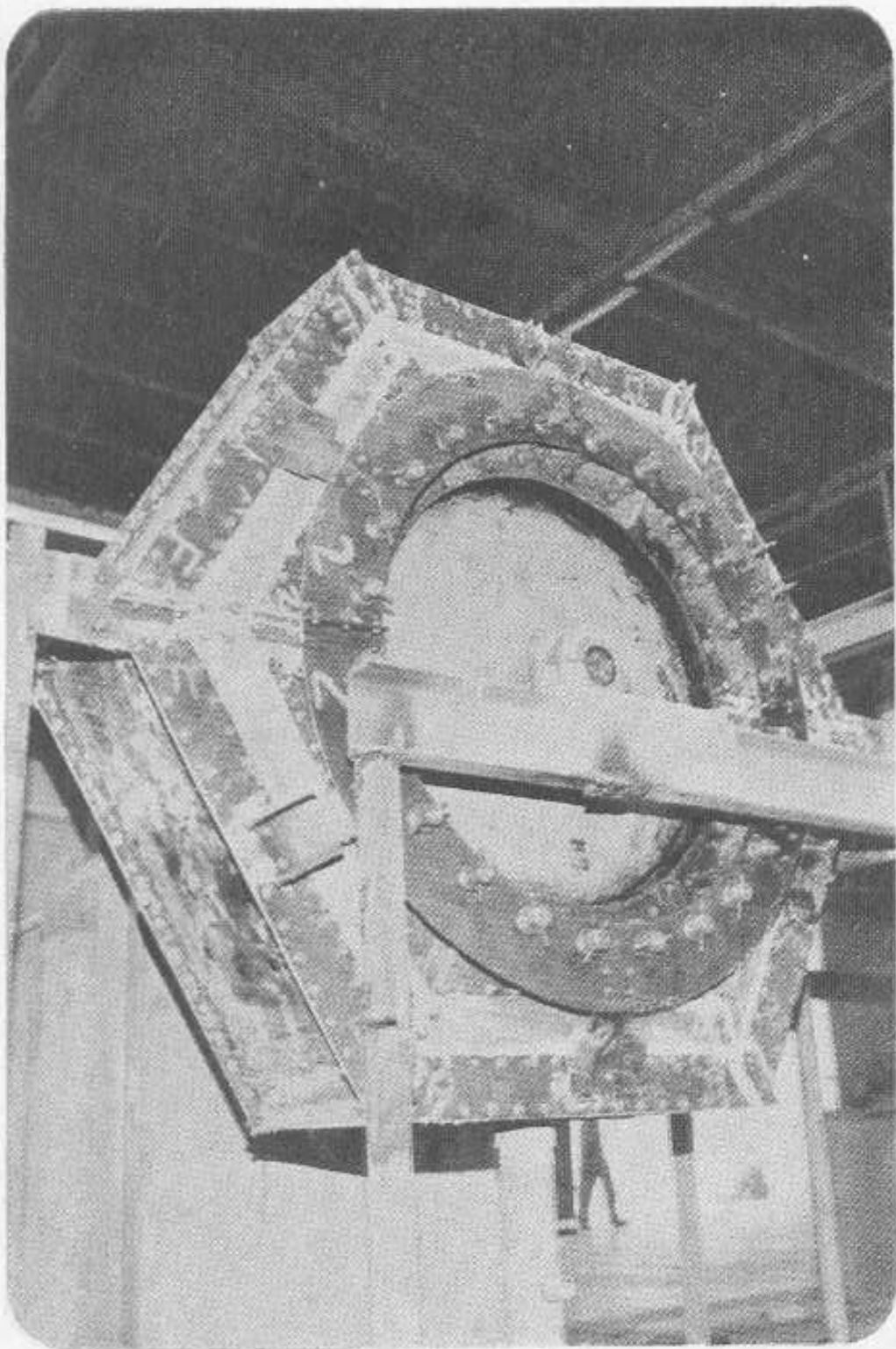
### INTRODUCTION

**T**HE dry process plants are normally equipped with closed circuit ball mills for raw grinding. Amongst various parameters affecting plant performance in grinding mill circuits, air leakage is one which when plugged effectively can improve the performance of grinding mill and kiln to a considerable extent. Infiltration of false air in the mill circuit affects the output (about 8-10%), material drying capacity (in case kiln gases are being used as drying medium in raw grinding mills), increases specific power consumption (by 10-12%) due to extra air handling and finally increases energy cost for raw meal production. The ESP and its fan common to both raw mill and kiln also get overloaded thereby affecting the output of kiln also.

Keeping in view these considerations, NCB has developed an improved air seal for discharge end of closed circuit/air swept grinding mills which prevents false air entering into grinding mill system. This Technology Digest briefly states the salient features and advantages of the improved air seal developed by NCB.

### PROBLEMS ENCOUNTERED WITH CONVENTIONAL AIR SEAL

In Indian cement plants, the air seal at the mill outlet is one of the major sources of false air in raw grinding mill circuit. Specially in case of a centrally discharged mill, the amount of false air entering through the discharge-end seal is quite alarming. In case of a 2400 tpd dry process cement plant (two streams of 1200 tpd each), false air entering into the two raw grinding mill systems has been observed as high as 59% and 39.8% respectively of the total false air in the entire kiln circuit.



*Improved Air Seal Designed and Developed by NCB*

Most of the air seals presently being used in Indian cement industry have felt fabric as a sealing material. The sealing material is suitably clamped in the fixed chute and is made to rub against the rotating part of the mill. High rubbing speed, presence of abrasive dust and coarse particles, temperature, eccentricity between fixed and rotating parts and thermal expansion of the mill are some of the factors which render these air seals ineffective in fully plugging the air leakage.

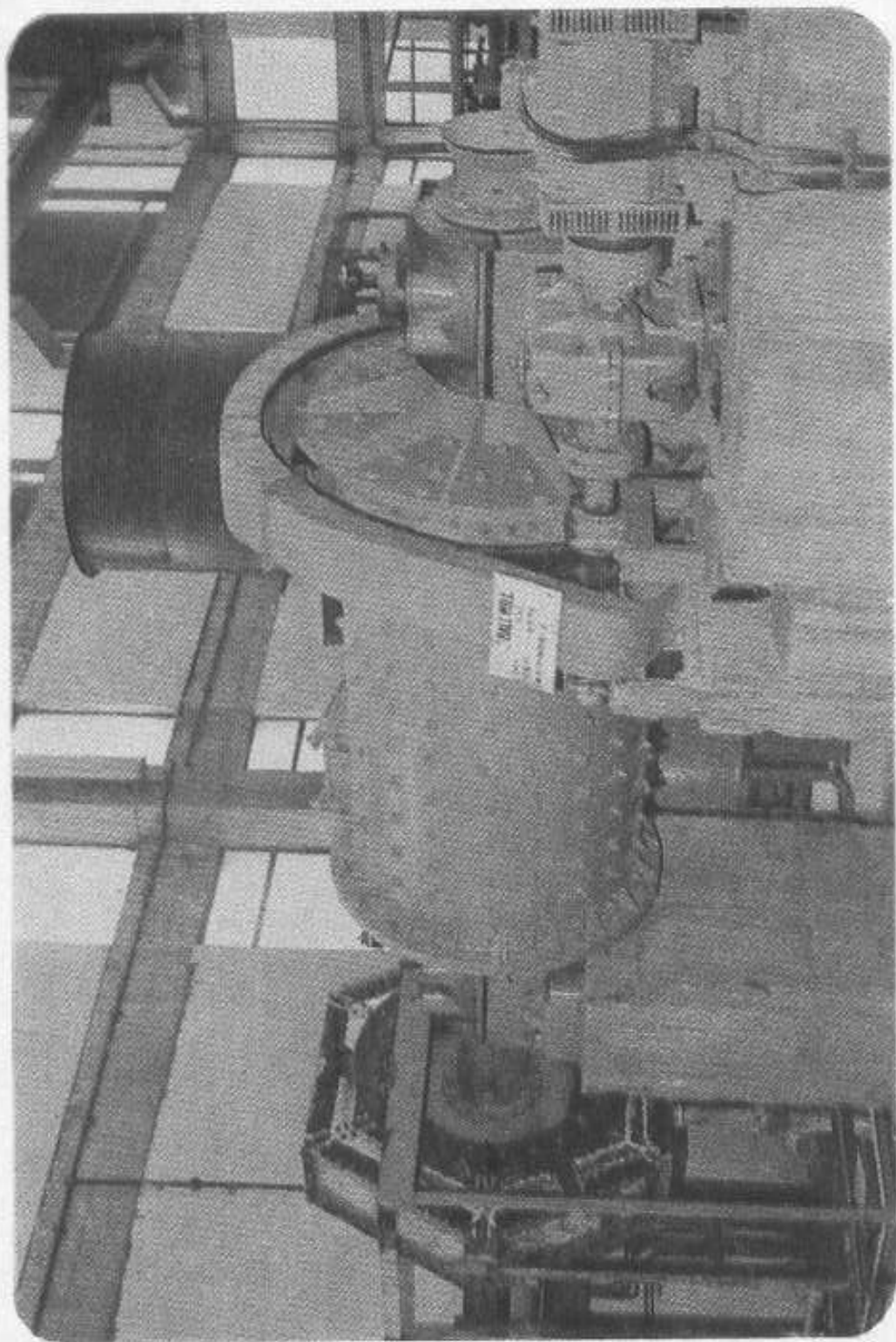
Moreover, in most of the cases, there is no provision for lubrication which leads to poor life of the sealing medium.

### **SALIENT DESIGN FEATURES OF IMPROVED AIR SEAL**

The salient features of the air seal developed by NCB, are :

- a) Radial and axial expansion as well as misalignment between the fixed and rotating parts of the mills do not affect the efficiency of the seal. This is made possible by :
  - i) Having sealing arrangement on the flat surface of the mill flange instead on its periphery as in the case of conventional sealing arrangements;
  - ii) Flexibility provided by the diaphragm and the spring tension helps in retaining the efficiency of contact even in case of heavy misalignment between the casing and the mill.
- b) Spring pressure always keeps the graphite packing in contact with the rotating part so that during the entire life of sealing medium (graphite rope) there is perfect sealing.
- c) Provision of lubrication helps in reducing friction and increasing the useful life of sealing medium.
- d) Design of the seal is such that the draft inside the mill helps in improving the efficiency of the seal.





*NCB Improved Air Seal Installed in a Ball Mill*

## TEST RESULTS

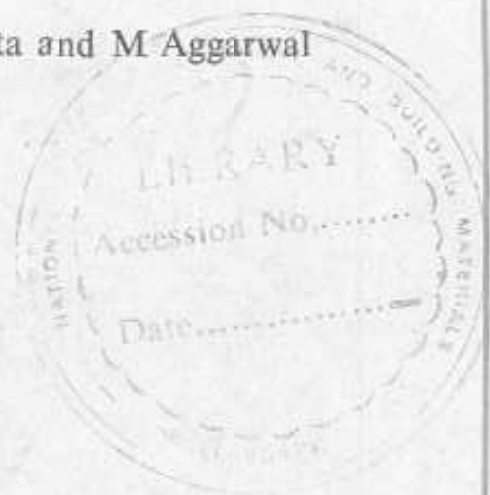
After designing and development, a pilot scale air seal was fabricated and installed at the discharge end of a grinding mill. The test runs of the seal have shown that the false air infiltration through the seal is less than 2%.

## TECHNOLOGY TRANSFER

The NCB designed Improved Air Seal for ball mill discharge end is available to cement plants. NCB will provide the design drawings of the seal which could be fabricated by the cement plants locally. The above seal is expected to yield an energy saving of about 1 kWh/tonne of clinker besides improvement in the output of the raw mill.

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Printed, published and edited by Shri S K Khanna on behalf of National Council for Cement and Building Materials, M 10 South Extension II, New Delhi 110 049 and Printed at Indraprastha Press (CBT), Nehru House, New Delhi 110 002

Regd. No. : RN 47303/86