



National Council for Cement and Building Materials

IMPROVING PRODUCTIVITY BY
SWEETENING POOR QUALITY COAL
WITH GOOD QUALITY COAL

FEBRUARY 1988

NCB
TECHNOLOGY
 DIGEST

IMPROVING PRODUCTIVITY BY SWEETENING POOR QUALITY COAL WITH GOOD QUALITY COAL

INTRODUCTION

COAL is the prime fuel for Indian cement industry as it is most abundantly available. However, bulk of the Indian coal is of poor quality. Metallurgical industries being preferential areas, are provided with relatively good quality coal with the result that cement industry has to be content with coal of very poor quality having ash content of 30-40 percent and sometimes even higher. There has been progressive deterioration in the quality of coal over the years and the trend is still continuing. Thus the average calorific value declined from 5800 kcal/kg of coal in 1960-61 to about 4000 kcal/kg of coal in 1986-87.

This Technology Digest describes the studies carried out by NCB in improving productivity by sweetening poor quality coal with good quality coal.

PROBLEMS WITH THE USE OF HIGH ASH COALS

The major problems with the use of high ash coals are : reduced coal mill output, increased grinding energy for coal mill, increased wear of mill linings, grinding media charge and coal conveying pipes, need for better quality limestone, increased fuel consumption, improper and inefficient burning of clinker, low ash fusion ring formation and decreased production.

The cement industry is not only facing the problem of high ash coals but also a problem of varying quality which is much difficult to handle. The problems associated with varying quality of coal are: ever changing burning zone conditions due to change in heat input, unstabilized production due to change in ash and operational problems, unstabilized coating due to change in flame temperature, reduced refractory life due to fluctuations in thermal stresses, clinker quality variation due to varying ash absorption in clinker, increased heat losses due to change in quantity of air, more downtime due to increased operational problems.

SWEETENING OF COAL

Among the various ways for the effective utilization of high ash coals, sweetening of poor quality coal with good quality coal could be an effective method. It helps in upgrading the coal quality and moderating the quality variations and in turn improve the productivity and product quality.

Since the technique of sweetening is relatively new to the Indian cement industry, NCB suggested suitable proportioning of high ash coal and low ash coal, mixing techniques and assisted in plant trials. Mixing of good quality coal with high ash coal can be done by various methods. The three mixing schemes suggested by NCB are as follows:

- a) Preblending of good quality coal with high ash coal.
- b) Separate crushing of two grades of coal fed to separate hoppers and then feeding to the coal mill in a predetermined proportion.
- c) Separate grinding of two grades of coal fed to separate fine coal hoppers and then proportioning before feeding to the kiln.

EXPECTED BENEFITS

The benefits associated with the use of good quality coal as a sweetener are: improvement in clinker quality, better utilization of marginal quality limestone, reduced erosion of refractory lining, reduced fuel consumption, increased kiln and coal mill output, increased pozzolana addition, reduced grinding energy, reduced operational problems and wear rate, and increased availability.

PLANT TRIALS AND RESULTS

Cement plants located in the vicinity of seaport were selected to study the impact of sweetening with good quality (imported) coal on productivity. NCB suggested the suitable proportioning mixing/blending techniques and monitored the plant trials.

The overall analysis of the data shows that the output has increased by 7-9% by reducing the ash percent from 33-34% to 27-28%. The quality




Sweetening of coal in cement plant

of clinker has improved in terms of C_3S content, granulometry and pozzolana absorption. Due to improved clinker quality the electrical energy consumption for grinding has reduced by 5 kWh/tonne of cement in one of these plants.







Apart from quantitative benefits the performance of various sections has improved considerably. There has been a steady control of operating parameters of kilns, better burning and increased running hours, higher output of coal mill and better fineness, improved cement mill output and increased running hours, etc, along with improved quality of cement with respect to strength and consistency.

The economic results of the plants are shown in Fig 1, which indicate a net profit of Rs 5.78 to 12.41 per tonne of cement. Studies thus concluded that sweetening gives a number of quantitative and qualitative benefits.

A. EXTRA COST

-  IMPORTED COAL COMPONENT
-  RAW MATERIAL CONSUMPTION

B. RETURNS

-  PRODUCTION INCREASE
-  POZZOLANA INCREASE
-  KILN POWER SAVING
-  CEMENT MILL POWER SAVING
-  SAVING IN AUX. FURNACE OIL
-  SAVING IN SWEETENER

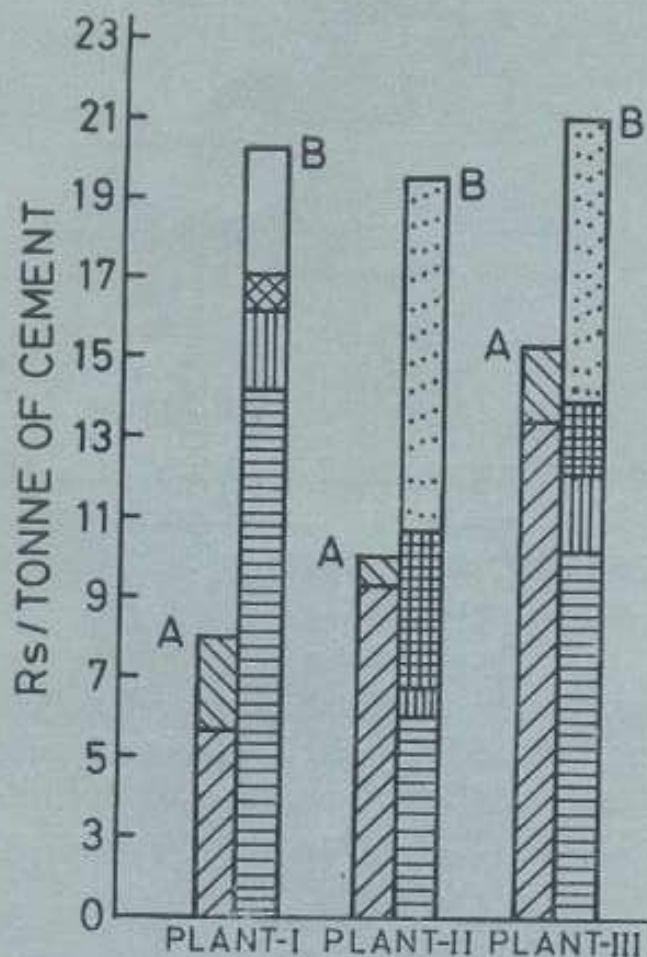


Fig 1 Coal Sweetening Benefits

However, the net economic benefits depend upon a large number of factors and conditions prevailing in the plant, like extent of deleterious effects due to use of low grade coal, critical areas of improvements, limitation of plant in terms of improvement of productivity factors, etc.

NCB EXPERTISE

NCB expertise and technical services backed by its sophisticated and modern technical facilities are available to take up such studies on sweetening of coal and to suggest appropriate proportioning and mixing/blending techniques in order to improve productivity.

Prepared by: S/Shri Kamal Kumar, A Pahuja and A K Dembla

Edited by: Shri S S Kalra

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