

to reduce the efficiency of the system in a very short time. Oxycats have functioned on a typical phthalic anhydride waste gas stream for two years without appreciable reduction of activity or necessity of cleaning even though inspection of the bed after 18 months showed evidence of the penetration of the aerosols and a deposit of iron sulphate.

Engineering for Complex Process Streams

For this type of process and for most applications involving complex gas streams, the catalyst should not be exposed to the stream below operating temperature. The catalyst surface can be damaged by an excess of condensable deposits, such as resins and other carbonaceous materials. This condition is easily avoided by using a damper arrangement and by-passing the catalyst until the

system has reached a minimum temperature.

The use of oxidation catalysts for air purification is not new, but much progress has been made in applying the principle for industrial use. New avenues are constantly being explored and, as demonstrated, many industrial odour problems caused by organic or combustible contaminants are being solved catalytically, regardless of the complexity of the process streams, by proper engineering and application.

Before these new techniques were fully developed such installations were often considered quite impractical due to excessive costs as a result of frequent catalyst replacement and other operating difficulties. Air pollution control equipment can only be successful if designed and built to operate with the same efficiency and reliability as other plant equipment.

Immersion Thermocouple Practice in the USA

BENEFITS OF TAPPING TEMPERATURE CONTROL IN OPEN-HEARTH FURNACES

The metallurgical and economic advantages to be obtained by using the platinum: rhodium-platinum immersion thermocouples were emphasised in the course of a paper on "Basic Open-hearth Steelmaking in the USA" presented during the meeting of the Iron and Steel Institute held in June in Belgium and Luxembourg (*J. Iron Steel Inst.*, 1958, **189**, (July), 205-216).

The authors, Dr. M. W. Lightner and Dr. D. L. McBride, both of the United States Steel Corporation, recall that for some time most steel plants confined their use of the immersion couple to recording bath temperatures just before tapping or furnace deoxidation. It was soon recognised, however, that the thermocouple could be a valuable tool for controlling bath temperatures within a prescribed range so that furnace banks and bottoms would not be damaged by getting heats too hot, while excessive ladle skulls could be minimised by avoiding cold heats.

Control charts were therefore established showing the relationship between bath temperature and carbon content which would permit rapid ore feeding without chilling the bath.

Throughout the plants of the United States Steel Corporation every effort is now made to tap all heats within $\pm 15^{\circ}\text{F}$ ($\pm 9^{\circ}\text{C}$) of the prescribed temperature. It is found that, with proper attention, all plants can tap at least 80 per cent of their heats within the specified temperature range, some plants consistently achieving 90 per cent compliance.

The excellent control of tapping temperatures has been accompanied by a substantial improvement in pouring practice, while other benefits obtained include a 21 per cent decrease in heats downgraded on account of skulls and a 22 per cent reduction in stool consumption. These improvements in quality have been achieved concurrently with a 7.5 per cent decrease in heat time.