SEMINAR ON REACTIVITY OF LIME IN STEEL MAKING

A Seminar to discuss 'Reactivity of Line in Steel Making' was held in the auditorium of Iscor's Head-quarters Building in Pretoria on the 5th August, 1971.

The Institute organised this Seminar on the occasion of the visit of Dr Obst of the Rheinische Kalkstein Werke GMBH, Wuelfrath, West Germany. The latter is one of the largest lime companies in the world and Dr Obst is in charge of their research laboratory. He and his co-workers have earned a reputation for their research into reactivity of lime in steel making.

This work is also of great importance to the steel industry in this country, particularly with the changes which are occurring with the introduction of basic oxygen furnaces.

Some 80 persons representing most of the major steel companies attended this Seminar.

Dr Obst presented his most interesting paper which he illustrated with projector slides. This paper is printed in full in this journal. This was followed by several contributions and active discussions.

The first contribution was made by Dr T. B. Beeton of the Research and Development Department, Iscor. He gave a brief summary of the studies on reactive lime carried out at Iscor since 1968. Their work was particularly related to the selection and definition of the various reactivity tests and the correlation of these with plant results. He demonstrated that the DIN methods, particularly the Din (40°) test, gave the best results and reported that good agreement had been reached between Iscor, Highveld and Northern Lime on future test procedures.

Mr B. Lowther of The Northern Lime Company then dealt with problems associated with the production of high reactive lime. The rotary kilns at The Northern Lime plant at Lime Acres are particularly suitable for the production of high-reactive lime, because this type of kiln lends itself to accurate control of temperatures and retention times. Several problems, however, exist. Because of the long haul distances and the deterioration of reactive lime by absorption of CO_2 and water, high reactive lime is not suitable for most customers. To constantly be changing kiln conditions to produce relatively small quantities of high-reactive lime, therefore, causes problems. Highveld Steel at present is the only company requiring high-reactive lime and a satisfactory product is now being produced at a cost because kiln capacity is reduced and fuel costs are higher.

Dr P. R. Jochens, of the National Institute for Metallurgy then submitted data to show how the reactivity of soft burnt reactive lime deteriorated due to long railage hauls. Detailed sampling of trucks had been carried out leaving the lime works and on receipt at Highveld and it was demonstrated that there was deterioration in the top layers of the truck. This top layer protected the balance of the lime which is still in good condition on arrival at Highveld. Exposure to atmosphere by further handling and storage into the bunkers at Highveld, however, resulted in further severe deterioration in the lime reactivity and the lime when finally fed to the Basic Oxygen Furnace is reduced to one third to one quarter of the original reactivity value. The same deterioration does not occur with normal run of kiln lime, which is burnt harder, but still has a satisfactory reactivity for most purposes.

Mr A. A. Hejja of the Department of Metallurgy, Witwatersrand University then made a contribution on the metallurgical aspects of the use of lime of different reactivities in the Basic Oxygen Furnace and the effect on desulphurization efficiencies. He gave a wealth of data on actual tests which had been carried out and came up with the surprising conclusion that the deterioration of high-reactive lime due to transport did not have as serious an effect on the efficiency of desulphurization as one would have expected. The efficiency was good provided high-reactive lime in the first instance had been produced, irrespective of whether it had deteriorated thereafter. Poor efficiency was obtained only when the lime in the first instance was produced in an unreactive form. The temperature rise in the Basic Oxygen Furnace also has a definite effect. If lime is introduced when the temperature is too high, soft burnt reactive lime becomes hard burnt and unreactive before it can dissolve in the slag. Use of ferromanganese slag assists dissolution of lime.

There was a great deal of discussion following these contributions. Particular interest was expressed in the special lime described by Dr Obst. This consists of a mixture of fine lime which is premixed with fluxes and either briquetted or pelletised. The question of injecting finely ground lime as an alternative was also discussed. Both these systems eliminate the necessity for highly reactive lime. With smaller lime particles, larger surfaces are exposed thereby ensuring more rapid dissolution in the molten slag.

The discussions generally were lively and informative and all present derived benefit from learning of the experiences of others. The valuable contribution made by our German visitor, Dr Obst, was particularly appreciated.

The instantaneous English-German translation service which was provided, greatly facilitated discussions.