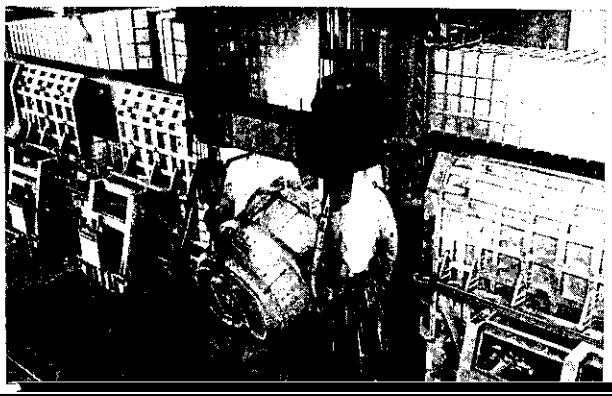
KAWASAKI STEEL TECHNICAL REPORT
No.1 ( September 1980 )

# Recent Progress of OBM/Q-BOP Steelmaking at Kawasaki Steel Corporation*

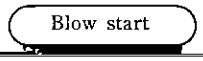
Kiyoji NAKANISHI** Tsutomu NOZAKI** Fumio SUDO***



Of all the properties of refractory required, the spalling resistance is most important, and yet a lack of reliable testing methods which enable accurately to predict performabilities of refractories under actual operating conditions, makes the available data of little value. At Research Laboratories of Kawasaki, a new testing method, "Panel-AE Spalling Test" has successfully been developed.[3)]

As a typical example, the panel spalling tests were made for three different types of refractories at the bottom wearing rate and the value of TD; obviously

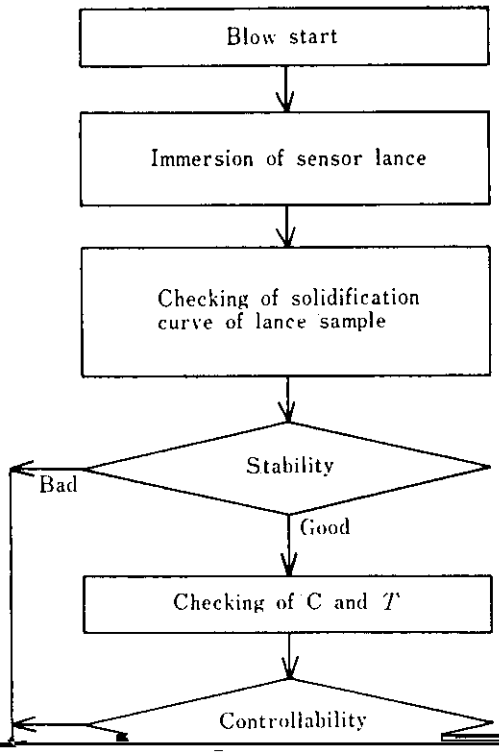
saki, which provided us with fully automated manipulations of setting a test probe, measuring, withdrawing a sample for chemical analyses, and so forth.




balance and the mass balance; hence nothing particular to be emphasized. On the other hand, there is one thing to be stressed on the mathematical equations of the dynamic model; namely, the accumulated amount of oxygen in the slag is quantitatively taken into

[redacted]

Another important factor is whether or not the data [redacted] accuracy.



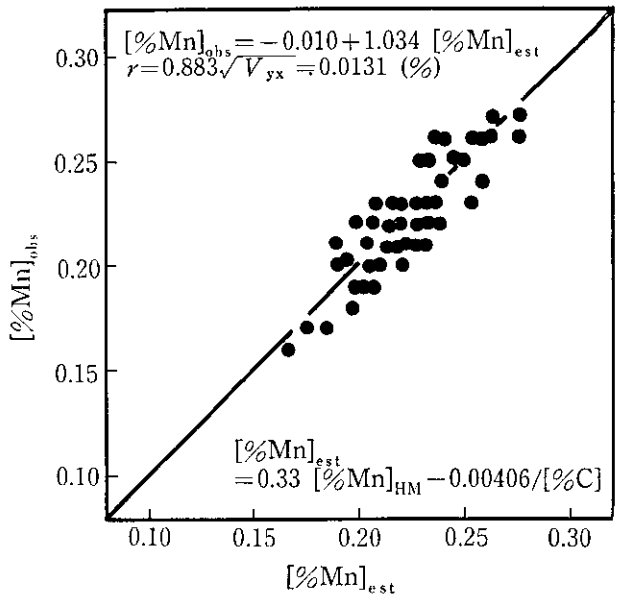




**Fig. 12** Comparison of observed Mn with predicted at end of blow

## 4 Metallurgical Aspects of Q-BOP[1-2]

Fig. 15 is lower in the Q-BOP than that in the LD

the iron yield is beneficially higher in the Q-BOP. As

phosphorus content in hot metal. The slope, however, is not so steep as being the case with the LD which is

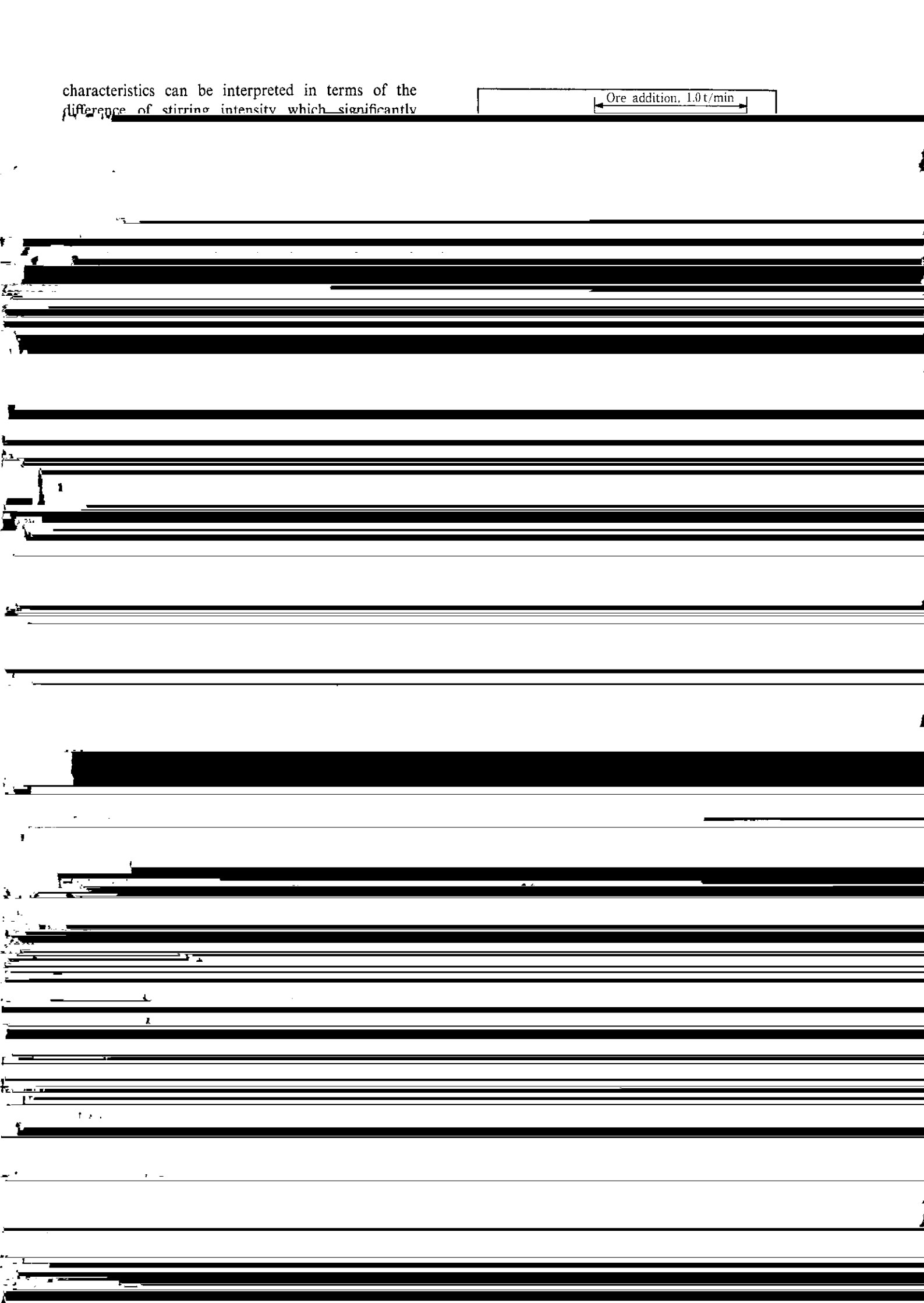
of high phosphorus hot metal.

**Fig. 20** shows an enhanced dephosphorization taking

provides us with an economical method for refining

from the LD or the EF. This is another evidence to

characteristics can be interpreted in terms of the difference of stirring intensity which significantly



(2) and (2′), the critical carbon content, C*, is evaluated

At the carbon content less than C*, the rate con-

observed value mentioned above; thus the value of $A$ turns out to be reliable enough to predict the size of bubbles dispersed in the bath of the Q-BOP as briefly

of carbon in the melt; hence the decarburization rate is proportional to the carbon content in the bath. In this case the oxygen efficiency for decarburization ($\eta$)

Let us put the mean radius of gas bubbles by $r$

$$= \frac{C - C_e}{} \qquad (8)$$

of the LD; hence the oxidizing power of the slag

blowing and the hard blowing practices in the LD.

To demonstrate another example for the validity of

unit time, the bulk of the steel in the Q-BOP has much

ducted by using the 5 t Q-BOP. The blowing pro-

During the second blowing down to the carbon content of 0.5%, the value of ISCO was kept constant

to obtain a higher yield of iron, and to save alloying and deoxidizing agents