KAWASAKI STEEL TECHNICAL REPORT

No.22 (May 1990)

Advanced Technologies of Iron and Steel,

Commemorating the 20th Anniversary

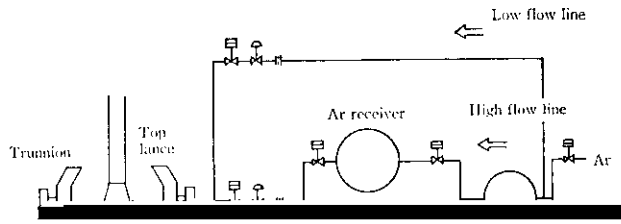
Recent Progress in Top-and-Bottom Blown Converters at Kawasaki Steel Corporation*

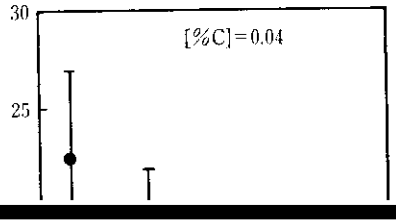
Synopsis:

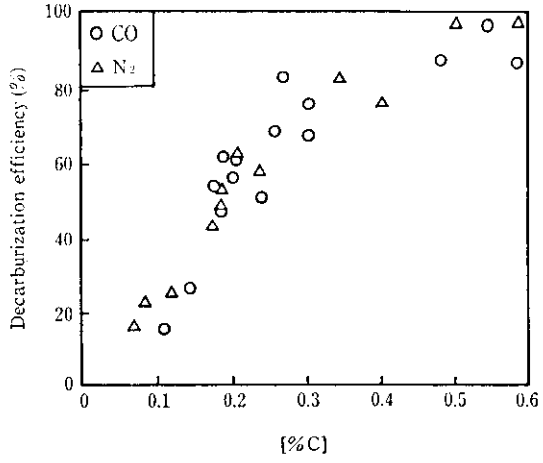
$\begin{pmatrix} P_1, T_1 \\ M_1 \end{pmatrix}$ $\begin{pmatrix} P_2, T_2 \\ M_1=1 \end{pmatrix}$

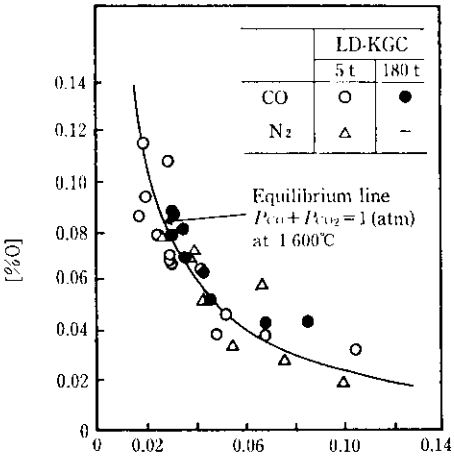
3) Development of Top and Bottom Plows

Converter with Wide Range Gas Flow Rate


Low flow line
Ar receiver
High flow line
Trunnion
Top lance
Ar


30
25
[%C]=0.04
end (%)





oxygen gas for decarburization and [%C]

nitrogen content of the purified CO gas is about 1%, but no difference was observed between the nitrogen content at blow end for CO blowing and that for Ar blowing.

4.1 IOD Experiments in 5-t Converter

A schematic diagram of the 5-t K-BOP is shown in

Fig. 8. Oxygen gas is blown through the inner tube of

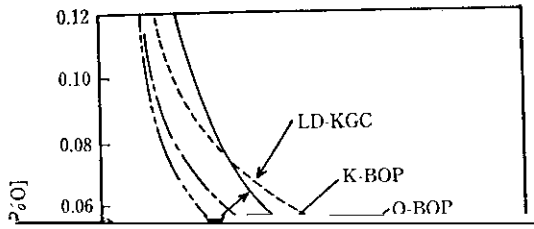
of CO gas pressure by CO_2 and that by Ar.

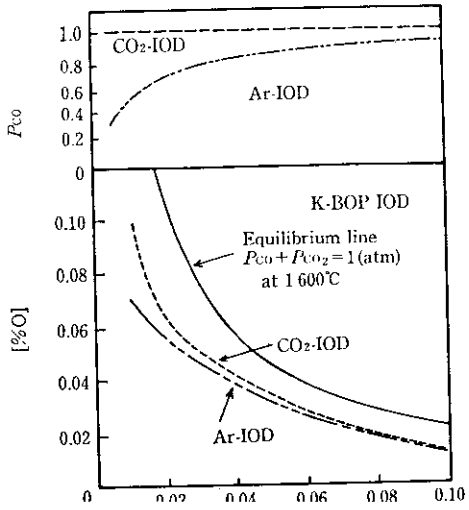
4.2 Commercial Operation of JOD in 250-t

production rate of iron oxide (i.e. FeO) in the reaction zone by the supplied oxygen (kg/min), C_j, b is the con-

Table 2 Values of parameter used in calculation

	Q (kg/min)	I (kg/min)	J (kg/min)
LD-KGC	2.4×10^{4}	8.0×10^{3}	5.0×10^{4}
K-BOP	4.5×10^{4}	1.0×10^{4}	6.25×10^{4}
Q-BOP	6.0×10^{4}	1.2×10^{4}	7.5×10^{4}





smelting reduction of chromium ore in the converter has been carried out, aimed at producing stainless steel without the use of ferrochromium[17,18]. This problem was also studied with the 5-t converter, mainly to clarify the effect of various methods of adding chromium ore on its rate of reduction. Based on these experiments, a stainless steel production system using two 85-t K-BOPs at the No. 1 Steelmaking Shop in Chiba Works has been developed with the use of smelting reduction pro-

$$\log \frac{\%Cr}{\%C} = 8.76 - \frac{13\,800}{T} \quad \cdots\cdots(12)$$

$$\log \frac{a_{Cr}P_{CO}}{a_C} = 8.48 - \frac{13\,520}{T} \quad \cdots\cdots(13)$$

The observed carbon concentration and temperature required to reduce chromium ore is higher than these equilibrium values. According to these results, in addi-

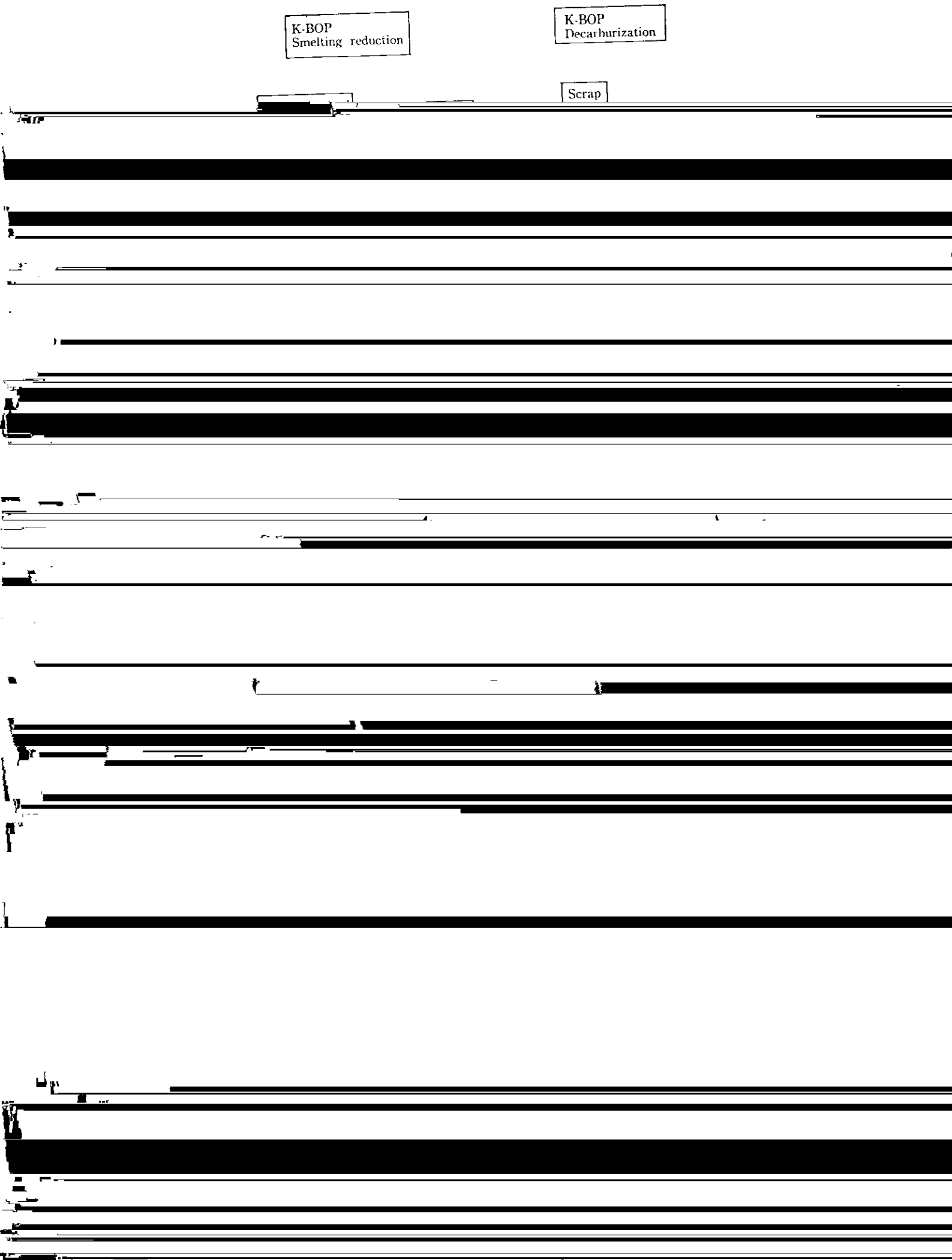
cess[19].

6.1 Smelting Reduction of Chromium Ore in 5-t Converter

Experiments were carried out with the 5-t converter

rate of dissolution of the chromium ore and its rate of reduction is considered important to obtain a high chromium ore recovery rate.

When raw chromium ore is injected through the bottom tuyeres, its recovery in the metal is about 20–50%


K-BOP
Smelting reduction
K-BOP
Decarburization
Scrap