Abridged version

KAWASAKI STEEL TECHNICAL REPORT
No.5 (May 1982)

Instrumentation in Ironmaking Process

Tadaaki Iwamura, Hiroshi Sakimura, Toshio Tamiya, Yujiro Segawa

Synopsis :
Instrumentation techniques in ironmaking process, mainly some unique function of sensors developed by Kawasaki Steel Corporation, are described as follows: (1) Yard: Ore bin level meter, automatic operation of yard machines, and quality monitoring system (2) Sinter plant: Raw material moisture meter, waste gas analyzer, heat pattern measurement, and waste gas volume pattern measurement (3) Blast furnace: Gas distribution measurement, burden profilemeter, burden surface monitor, vertical distribution measurement, circumferential distribution measurement, burden distribution control, equipment monitoring system, and instrumentation for hot metal handling.

The body can be viewed from the next page.

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Tadaaki IWAMURA** Hiroshi SAKIMURA**
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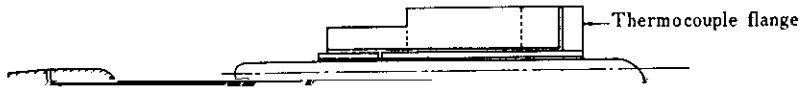
Instrumentation techniques in ironmaking process, mainly some unique functions of

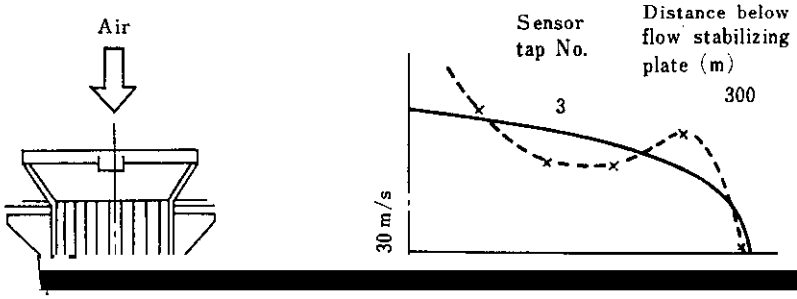
[1] Yard: Ore bin level meter, automatic operation of yard machines, and quality

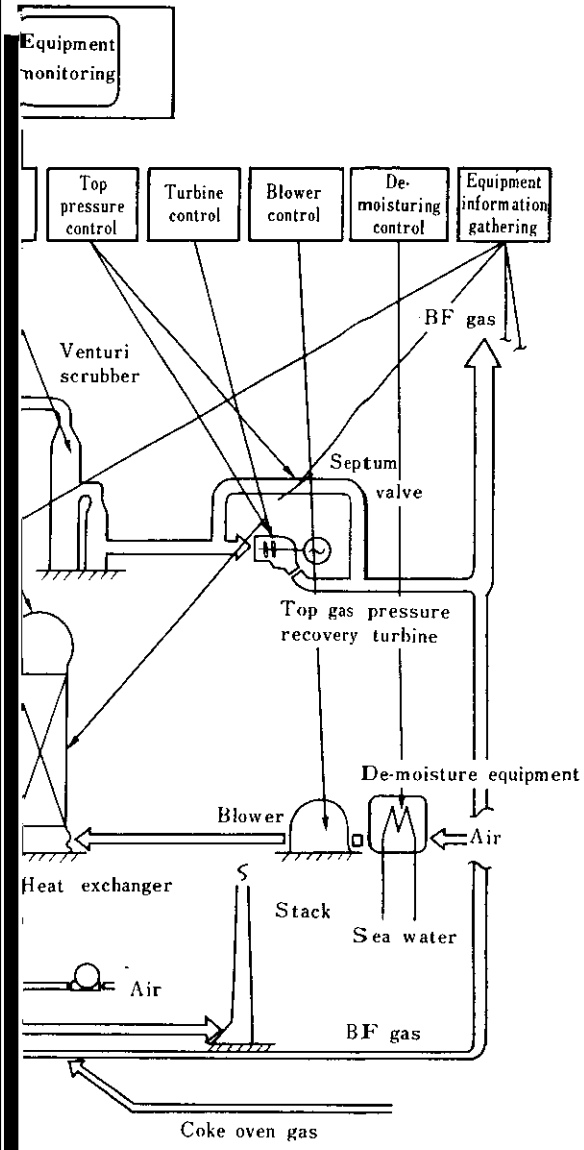
the steel works, and therefore, reduction in coke consumption and unit fuel consumption in the ignition

yard process computer.

At the West Plant of Chiba Works, existing


Thermocouple flange


Air
Sensor tap No.
Distance below flow stabilizing plate (m)
3
300
30 m/s



last furnace

Instrumentation and operation techniques have progressed interdependently, stimulating each other. On one occasion, the former met the needs of the latter while, on another, the development of the former gave

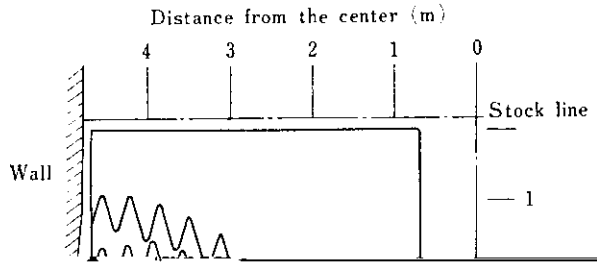
throat in which the gas temperature distribution is measured with CA thermocouples placed at intervals in the radial direction.

The indirect measuring method using the gas com-

A: Excessive central flow; frequent tuyere bending

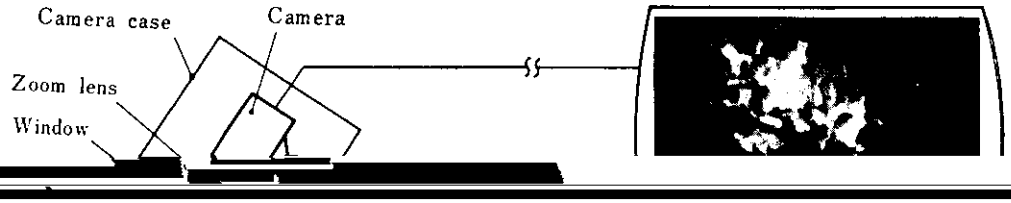
Fig. 9 shows a comparison of these three methods

methods. **Fig. 10** (b) shows the profile movement at the



can directly visualize the movement of raw material lumps themselves on a TV screen and is used for monitoring such abnormal in-furnace conditions as burden influx or "channelling."

Since the blast furnace interior of high temperature and high pressure contains a large quantity of dust, various techniques are applied to washing and pro-


Camera case
Camera
Zoom lens
Window

ucts quality and quantity by the tap hole, partial

Burden distribution is controlled by the position

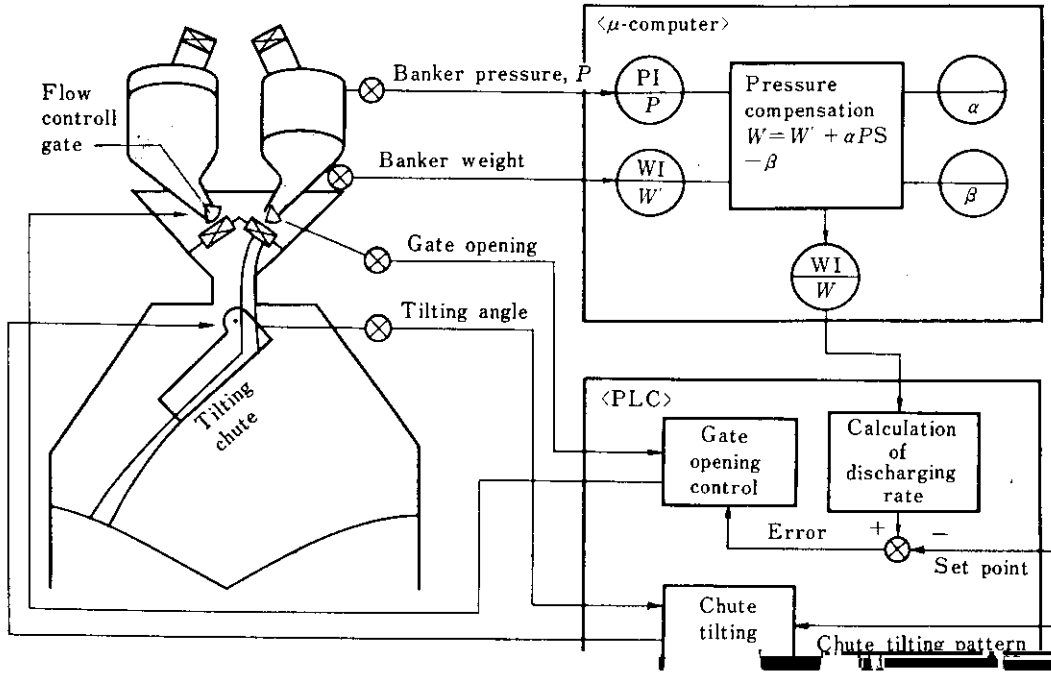


Fig. 15 Charging rate control system

charged burden, and it is important to detect the first sign of leakage and immediately replace the tuyere

In No. 6 BF at Chiba Works, the influence of drift is removed by installing a by-pass line for calibration

Tuyere damage rarely occurs recently except for wear of tuyeres, and therefore, reliability of detection is particularly required. For the method of detecting water leakage, the difference in water flow rate between

use to the pipeline system, applying the same flow rate to the flow meter for water inlet/outlet and correcting the instrumental error automatically. This correction of the instrumental error doubled the accuracy of dif-

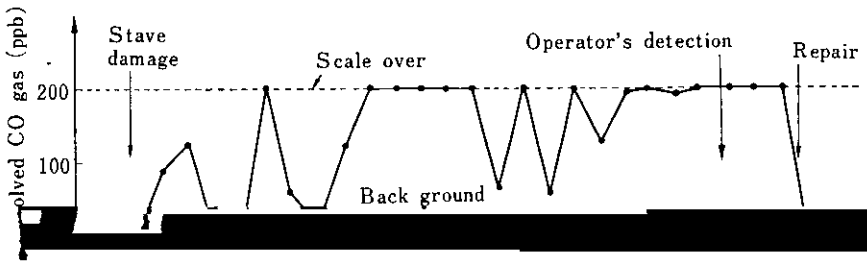
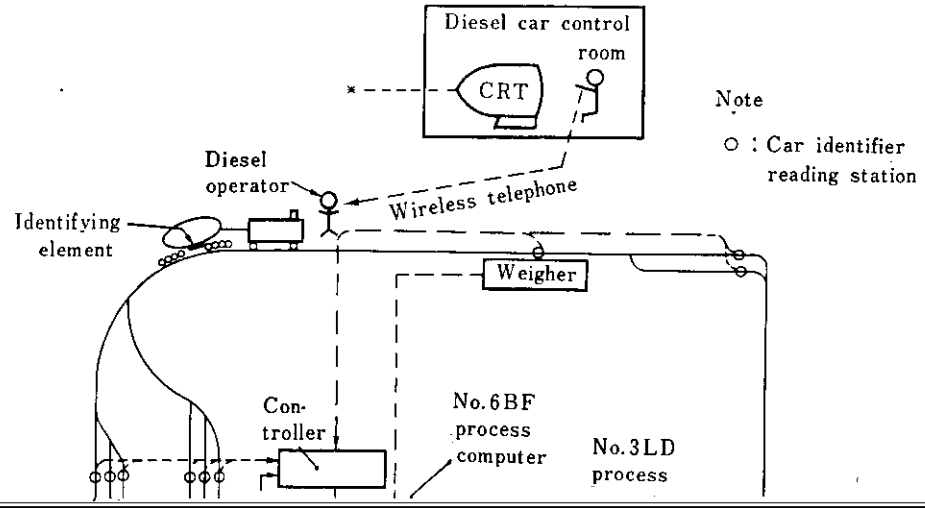


Fig. 17 Record of dissolved CO gas when a stave was damaged


Diesel car control room
CRT
Note
○ : Car identifier reading station
Diesel operator
Wireless telephone
Identifying element
Weigher
Con-troller
No.6BF process computer
No.3LD process

cells are used for keeping accuracy, and a weight checking device is used for calibration purposes

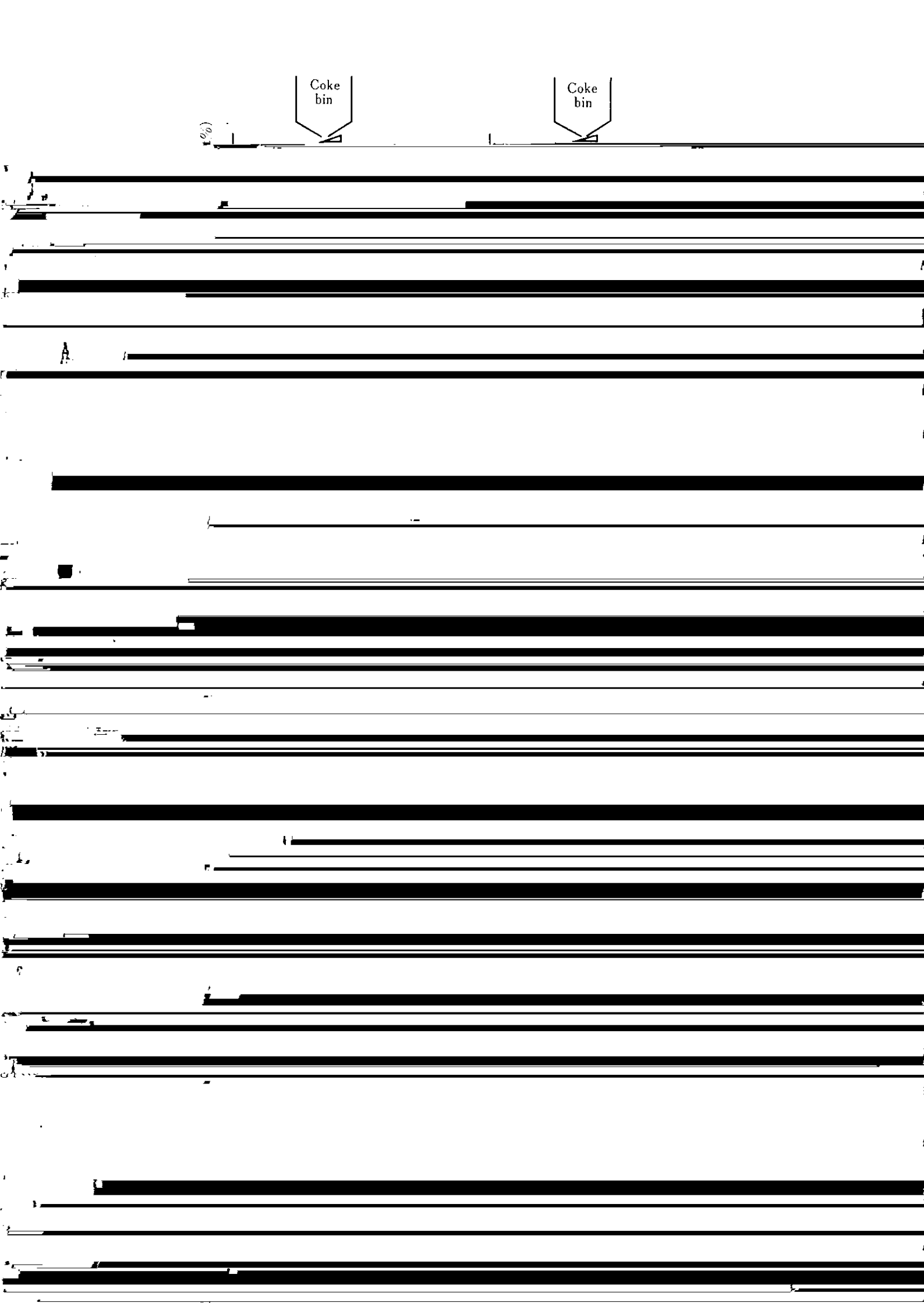

Coke bin
Coke bin

Table 1 Running cost comparison for measuring combustion air flow rate of hot stove

Running condition			
Measuring points			4
Line flow rate	Q (m^3/h)		1.80×10^5
Specific gravity in line condition	γ_f (kgf/m^3)		0.718
Fan utilization	η_1		0.97
Fan efficiency	η_2		0.80
[illegible]	[illegible]		0.20

[redacted]

Differential pressure, DP	(mmH_2O)	24.4	126.5

[redacted]

hot metal and slag levels inside the furnace, heat levels

inside the furnace, and the quantities of erosion of the furnace wall and hearth.

At the same time, attention should be paid to the

References

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