KAWASAKI STEEL TECHNICAL REPORT
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Construction and Operation of Hot Metal Pretreatment Facilities at Mizushima Works

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Synopsis :
Hot metal pretreatment facilities at Mizushima Works were started in March 1985. They consist of equipment for desiliconization in runner at No.4BF and desiliconization, dephosphorization and desulfurization in torpedo cars. The facilities also include a torpedo car cleaning equipment for preventing torpedo car from turning pollutive. The hot metal pretreatment facilities have the following features: In the desiliconization equipment in runner, a two-dispenser method is adopted for mass treatment of desiliconization: in the Hot Metal Pretreatment Center, a post-mix method which mixes four different kinds of fluxes at a merging point in injection pipes, and a slanting injection lance is used; and in the torpedo car cleaning equipment, a remaining-hot-metal treatment method is used in molten iron condition during slag-off. Recently, the monthly amount of dephosphorized hot metal has exceeded 100 000 t. A supply of desiliconized or dephosphorized hot metal to converters has been found highly advantageous in cost saving.

The body can be viewed from the next page.

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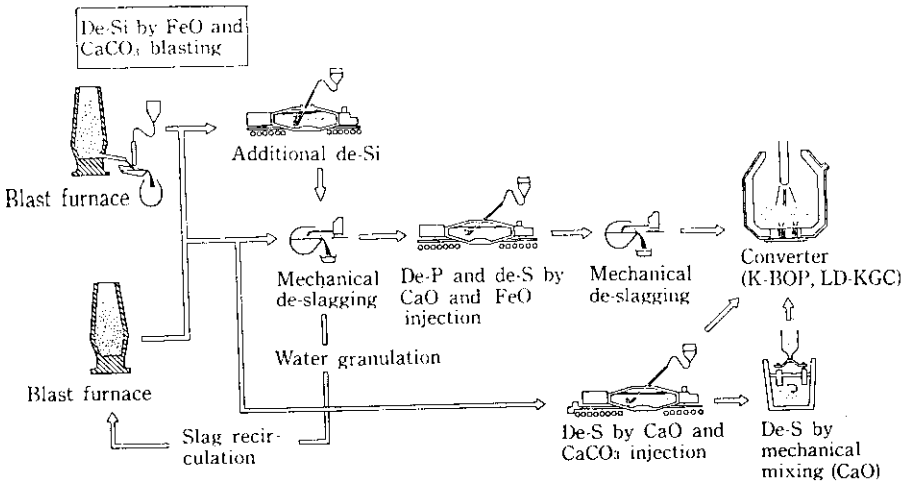
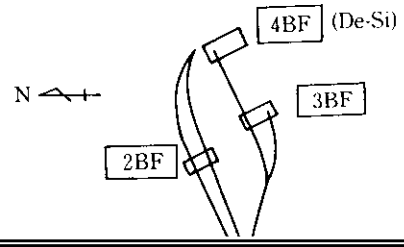


Fig. 1 Hot metal pretreatment process at Mizushima Works

2 Makeup and Layout of Hot Metal Pretreatment Facilities

An outline of the hot metal pretreatment process is shown in **Fig. 1**. After blasting-type desiliconization treatment in the tilting spout of the blast furnace, the hot metal is transported by torpedo car to the Hot Metal



1 Main agent

supply of pretreated hot metal to the converter plants, even with dephosphorization, which has a long treatment time.

(2) Mechanical deslagging equipment was adopted because this type of equipment permits stable deslagging regardless of the properties of the slag.

(3) To obtain suitable composition of the fluxes to be injected in the treatment, an online mixing system was developed and adopted. All flux types can be mixed separately at the injection line. In other words, precisely the required amounts of four fluxes

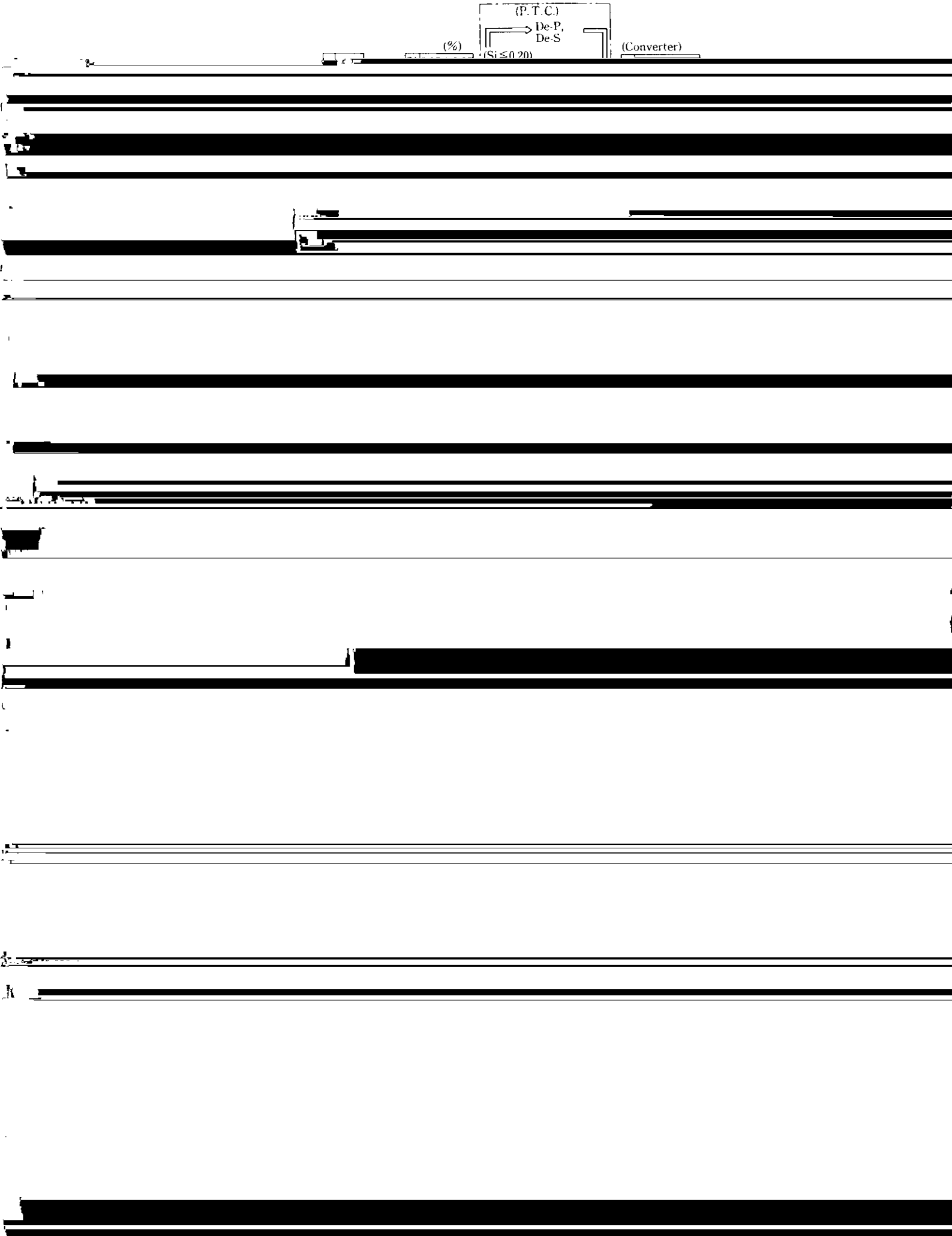
Table 3 Specifications of Torpedo-car Cleaning Center equipment[3]

Item	Specification
Capacity of hot metal ladle	15 ton
Volume of slag ladle	6 m³
Full load capacity of hot metal ladle car	30 ton
Maximum capacity of heating facilities	80×10^4 kcal/h

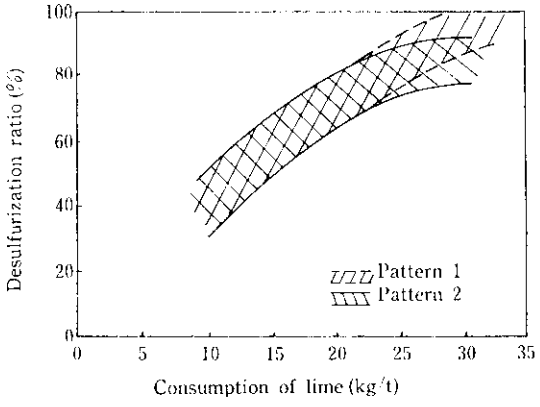
equipment is a slag breaker, ladle car with scraper, ladle

of the injector pipes. This system makes equipment for premixing of fluxes unnecessary. Further, it has become possible to change flux composition for each treatment unit or in series during treatment.

To prevent the loss of the hot metal remaining in the torpedo car together with slag, the remaining hot metal is kept in the molten condition during the removal of hot slag and is returned to the torpedo car after completion of deslagging. This is the distinguishing feature of


(P. T. C.)
De-P,
De-S
(%)
(Converter)

(1) Injection pattern 1 (0.02~0.03%P, 0.003~0.005%S)



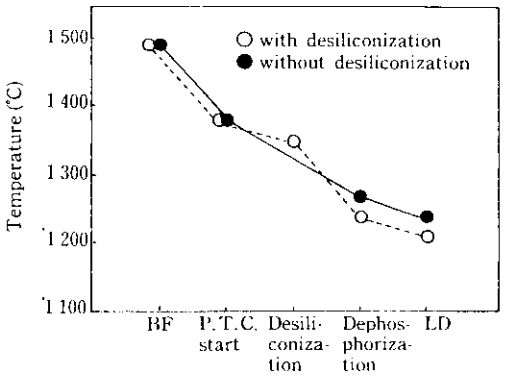
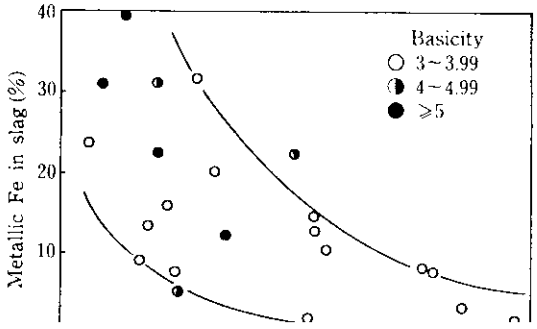


Fig. 13 Relation between desulfurization ratio and consumption of lime

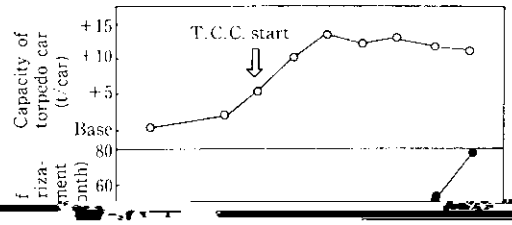


and sulfur contents and the flux composition is determined in view of these unit consumption values to ensure that dephosphorization and desulfurization proceed efficiently.

Effects of injection patterns on desulfurization effi-

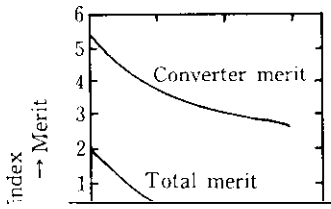
ciency during dephosphorization are shown in **Fig. 13**.

1 200 1 220 1 240 1 260 1 280 1 300



and a reduction of added ferroalloys made possible by an increase in the manganese recovery rate.

The relationship between the phosphorus content of pretreated hot metal and unit burnt lime consumption is shown in **Fig. 18**. Unit burnt lime consumption decreases with decreasing phosphorus content of pre-



100 000 t/month for dephosphorization.

The facilities have the following features:

(1) Desiliconization equipment in the runner at the blast furnace:

(a) The blasting method, which ensures high reaction efficiencies, was adopted for the addition of