(PM) Process with 250-t BOF Melts*


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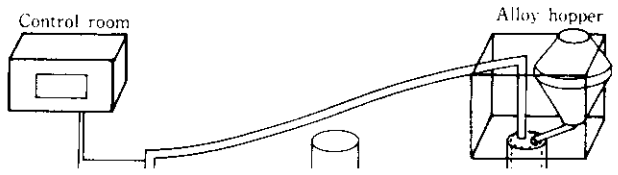
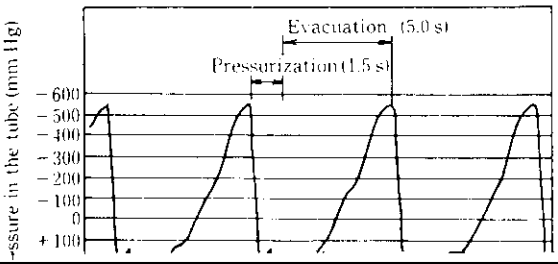
Synopsis:

Mass production test for the 250-t PM process was carried out on the commercial production line and the following results were obtained:
(1) Stirring intensity of the melt is equal to or better than that of the RH degassing process.
(2) The rate of deoxidation and yield of alloying elements are excellent, equivalent to those of the RH

strongly stirred, and the stirring force near the bath surface is relatively weak. It may be said that the injected


Control room
Alloy hopper



measured for a portion of the aluminum-silicon-killed steels. In addition, ultrasonic testing of products was carried out.

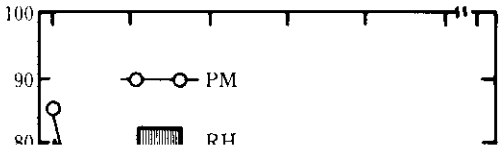
4.2 Time Required for Uniform Mixing

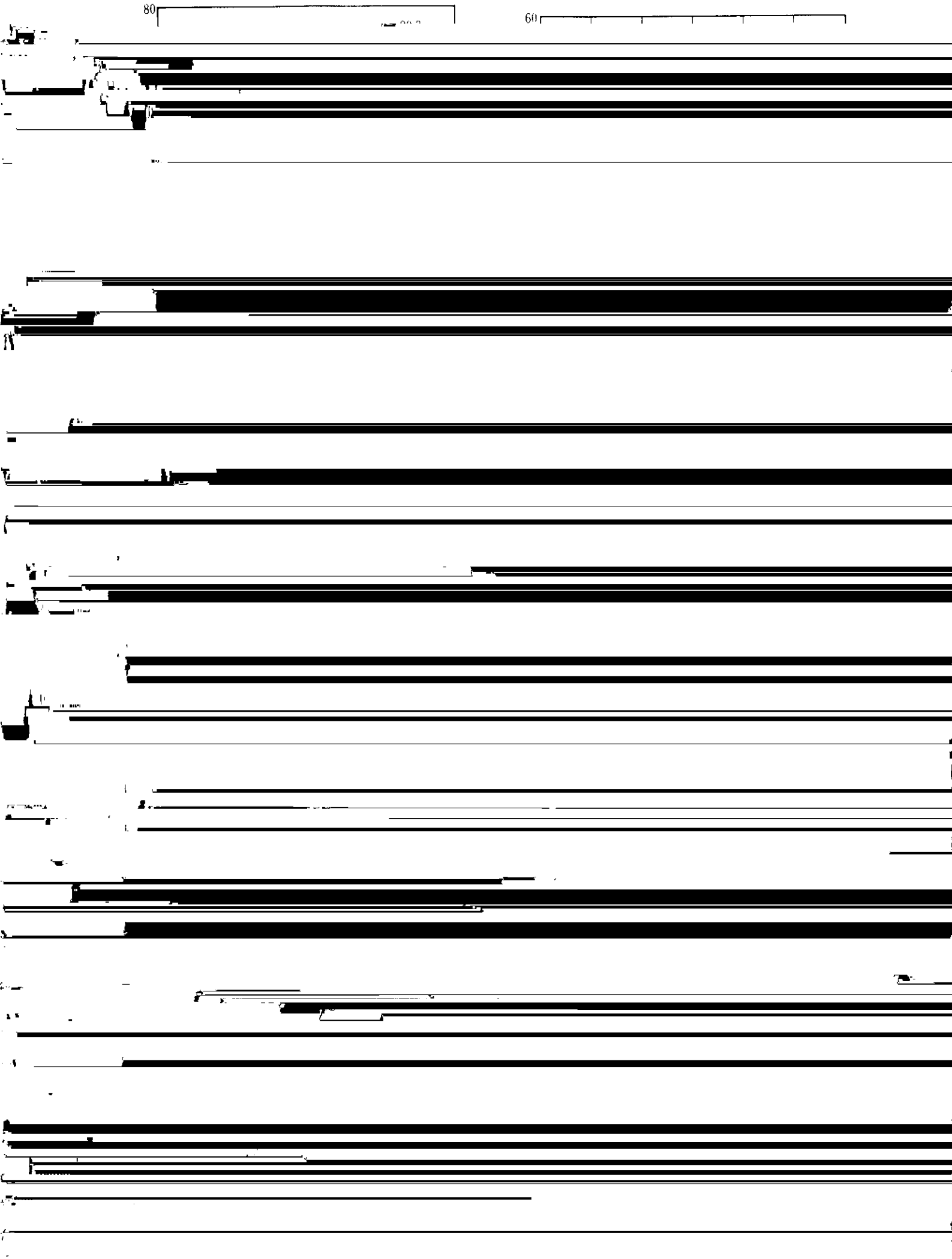
The uniform mixing time was measured to evaluate the molten steel stirring force, which is considered one of the most important functions of ladle refining equip-

Table 3 Comparison of mixing time in various processes

(sec)

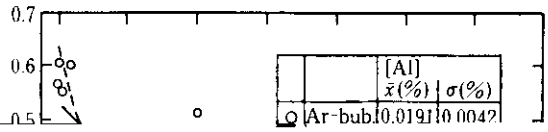
PM	RH	DH	ASEA-SKF	VOD




80
60

(2) Oxidizing slag does not flow in.
(3) Added alloys are carried by molten steel streams to the ladle bottom.

Therefore, an investigation was made into the yield



be adjusted within ±0.01% of the target [C] value.

4.4.3 Addition of other ferroalloys

4.5.2 Amount of phosphorus pick-up

Figure 15 shows a comparison of amounts of phos-

and boron were added during the PM treatment as Fe-

the argon bubbling process, respectively. The amount

4.6 Molten Steel Temperature Drop

Figure 17 gives a comparison of the molten steel temperature drop in the PM process and the RH and argon bubbling processes. In the PM process, the temperature

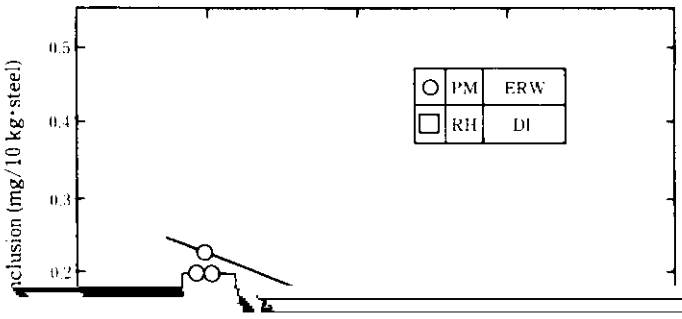
molten steel heat loss during the PM treatment is about 25 to 30% less than in the RH process. Compared to the RH process, the contact area between molten steel and the refractory is small in the PM process and the exposed area not covered with slag also is small.

the same as in the argon bubbling process. When the

refining process excellent also in terms of molten steel

made into changes in oxide inclusions during treatment, distribution of sulfur spots in slab representing

spots in the PM-treated steel is approximately the same as that in the RH-treated steel. Thus, the PM process



50~ 100~ >150
100 150

Dia. of inclusion (μm)

Fig. 20 Amount of large inclusion extracted by the slime method

N_2 gas ——— The others

(1) Time required for uniform mixing
Uniform mixing time is only 100 to 200 sec. This process provides a sufficient stirring force to molten steel, in spite of the simplicity of the equipment.

(2) Deoxidation
The oxygen concentration after treatment is low and amount of phosphorus pick-up due to the presence of slag are small. The PM process is low in susceptibility to the influence of slag on the bath surface.

(7) Operations costs
The cost of refractories accounts for the greater part