KAWASAKI STEEL TECHNICAL REPORT
No.35 (November 1996)
Steel Structure, and Continuous Casting of Steel

Control Molten Steel Flow in Continuous Casting Mold by Two Static Magnetic Fields Covering Whole Width

Akira Idogawa, Yoshihisa Kitano, Hirokazu Tozawa

Synopsis :
A new device, FC mold (flow control mold), was developed to improve the quality of final products, cast at a high speed. It has two pairs of poles that generate static magnetic fields. In order to optimize steel flow in a continuous casting mold, one of the fields imposed is at the meniscus and the other is below the submerged entry nozzle(SEN). Both of the fields cover the entire width of the mold. The principle and effects of this device were confirmed through mercury model experiment, industrial application to the No.3 caster at Chiba Works and numerical simulations. The industrial application demonstrated good effects on the surface and internal qualities of the products. Kawasaki Steel has already introduced the FC molds for industrial production at the No.4 caster in Mizushima as well as the No.3 caster in Chiba. They are contributing to high productivity and high product quality.

The body can be viewed from the next page.

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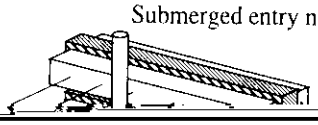
Upper mercury
(mm)
100
2 Fields

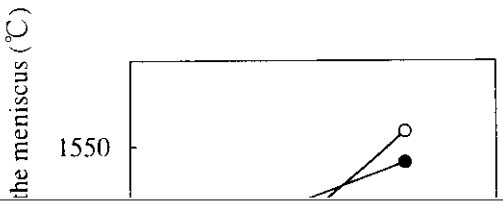


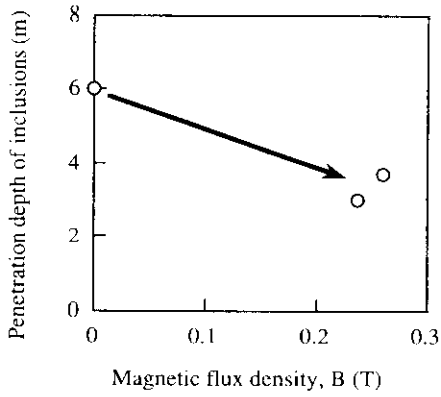
bon steel and ultra-low carbon steel.

3.2 Operational Results of FC Mold

0.28T is imposed, the average flow velocity was reduced to 78% and fluctuations decreased to 43%.

Moreover, precisely the same results were obtained for the flow velocity of the molten steel surface by measuring the height of the swelling of the melt surface at the narrow faces (side walls).





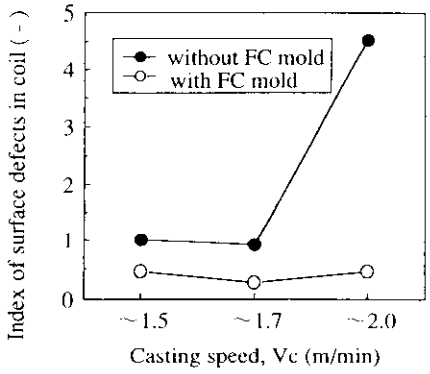
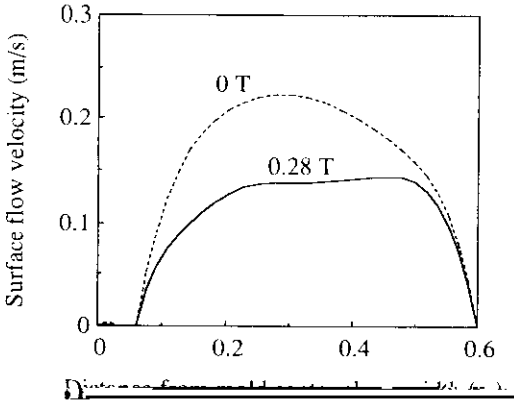
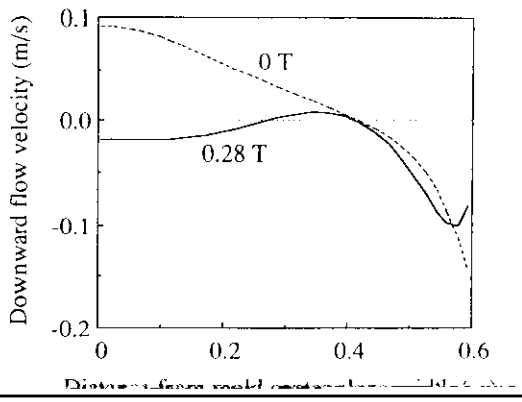


Fig. 10 The effect of the FC mold on the surface

onsidered to show the effectiveness of the lower poles

Table 2 Conditions of numerical calculations


Surface flow velocity (m/s)
0.3
0.2
0.1
0
0 T
0.28 T
0
0.2
0.4
0.6


Downward flow velocity (m/s)
0.1
0.0
-0.1
-0.2
0 T
0.28 T
0
0.2
0.4
0.6

ined by flow analysis using numerical calculation.

5) H. Ishizuka, S. Yamada, M. Ohnishi, S. Kakihara, H. Tozawa,