

MOLD POWDER IN THE PRODUCTION OF HIGH GRADE WIRE RODS FOR COLD HEADING USE

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The kobe No.4 continuous caster is a billet caster which started operations to produce high quality bars and wire rods, including wire rods for cold heading use. Steel for cold heading use undergoes substantial deformation at room temperature, so the quality level which the customer requires is very high. Therefore, the steel produced by the billet caster must be of high quality in the billet stage.

In this paper, new mold powder for improving cold headability is discussed.

1)Mold powder for medium carbon steel ([%C] =0.30 ~ 0.50)

For medium carbon steel, the causes of cold heading cracks are mainly surface cracks in the billet or the entrapped mold powder near the surface. First, the physical properties of molten powder slag were optimized by investigating the billet surface which was etched by hydrochloric acid. As a result, a suitable viscosity and solidification temperature were found. Second, the sintering properties were improved to prevent slag bear formation in the mold during casting. Figure 1 shows cold headability using several kinds of mold powder.

2)For low carbon steel ([%C] =0.08 ~ 0.15)

For low carbon steel, the causes of cold heading cracks are mainly subsurface cracks caused by surface depressions. To prevent them, it is necessary to slowly cool the solidified shell at meniscus. Figure 2 shows the calculated heat flux between the solidified shell and the mold. From this figure, mold powder which is solidified at a high temperature is effective in reducing depressions. And moreover, in order to keep the soft cooling at the meniscus stable, mold powder which solidifies quickly was developed. As a result, cold heading cracks are rarely detected.

CONCLUSIONS: Several kinds of mold powder for billet casters were developed in order to improve cold headability. For medium carbon steel, sintering properties are important, and for low carbon steel, solidification properties are important.

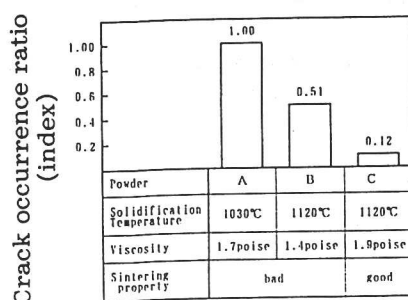


Figure 1 Effect of mold powder on the cold headability of medium carbon steel

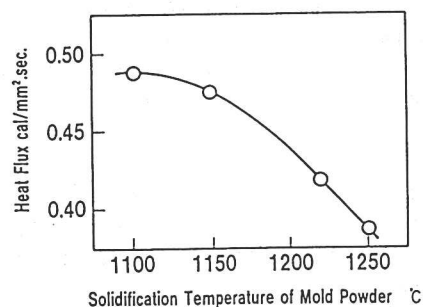


Figure 2 Effect of solidification temperature of mold powder on heat flux