1. Introduction

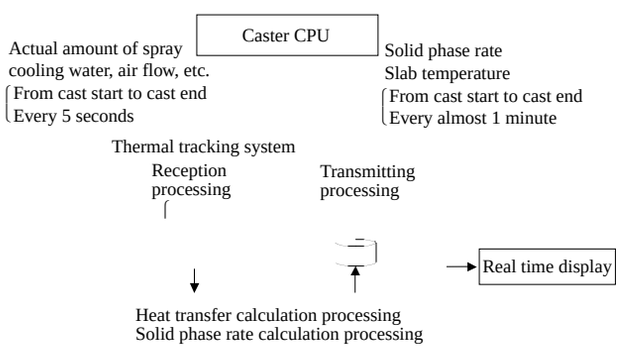
The real-time information on the temperature and solidification conditions of a slab in the continuous casting machine is essential for improving the surface quality and internal quality of the continuously cast slab. This paper describes the development and commercialization of a non-steady state, on-line thermal tracking model which meets this requirement.

2. Outline of On-Line Thermal Tracking Model

The use of a 2-dimensional non-steady heat transfer calculation program makes it possible to incorporate the constantly changing casting parameters in calculations and accurately simulate the temperature and solidification condition of the slab even in the so-called non-steady state where the casting speed change during the ladle change as an example. A general description of the thermal tracking system is shown in **Fig. 1**.

3. Results of On-Line Non-Steady Heat Transfer Calculations

The examples of the calculation results of the slab temperature profile and solid phase rate line (solidified solid phase ratio) are shown in **Figs. 2** and **3**, respectively.



4. Features of Model

(1) The model herein described can perform the heat transfer calculations in real time from the start of casting to the end, in both steady and non-steady states, and the results are observed simultaneously.

(2) By incorporating secondary cooling spray width-cutoff conditions in the calculation conditions:

(a) Temperature profiles can be obtained at any desired position (surface/internal).

(b) Any desired solid phase rate line can be obtained.

5. Summary

The application of the on-line thermal tracking

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model to the continuous casting machine makes it possible to improve a variety of applications and their effects. The examples include the following:

(1) The as-cast (conditioning-free) slab ratio and direct hot charge ratio (improvement in corner cracks, oscillation cracks) by improvement of secondary cooling spray can be increased.
(2) The slab internal quality can be improved by use of this model in combination with dynamic roll gap control (CCM hardware).

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