Estimation of Effective Thermal Conductivity for Continuous Casting Thermal Models

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In the continuous casting process, thermal models proved to be an important tool to describe the influence of operative variables on temperature distribution and solidification profile along the solidifying bars. However, these models require a number of simplifications in order to provide results in a reasonable time. One of the boldest approximations is the assumption of an effective thermal conductivity for the liquid steel. This effective conductivity takes into account the increased heat transport in the liquid core due to convection. As a consequence of this approximation the temperature distribution on the liquid steel is badly calculated and –what is more important- the heat extraction in the upper part of the liquid pool is wrongly estimated. Though this uncertainty has low influence on variables of interest in the lower part of the strand (like the metallurgical length or the solid shell thickness at the straighteners) it may lead to poor results if interest is focused in the near mold region.

In the present work a thermal model for the continuous casting of rounds is presented. It was designed to provide on line information about the thermal status of the solidifying bar. Particularly, a methodology to estimate effective thermal conductivity is introduced in order to render results consistent with CFD analysis.

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