

Numerical Modelling of Volume Defects in Heavy Steel Ingot Under Different Boundary Conditions

TKADLEČKOVÁ Markéta

VŠB – Technical University of Ostrava,
Faculty of Metallurgy and Materials Engineering,
Czech Republic

The paper describes the pre-processing, processing and post-processing of numerical modelling of casting and solidification of heavy steel ingot. The numerical modelling was realized in ProCAST software under the conditions of the Department of Metallurgy and Foundry and Regional Materials Science and Technology Centre (RMSTC) at VSB-Technical University of Ostrava. The aim of numerical modelling was the optimization of the production of heavy steel ingots produced in VÍTKOVICE HEAVY MACHINERY a.s. The attention was primary focused on the minimization of volume defects in 90-ton heavy steel ingot, such as porosity and macrosegregation. In the case of casting and solidification of heavy steel ingots, among the most important and the most easily influenced technological parameters belongs the casting temperature and casting speed. In contrast, the conditions of heat transfer are defined by the thermal characteristics of the mould material. The material of casting system is usually chosen based on the experience of the steel plant. Therefore, it cannot be arbitrarily changed. For this reason, the attention was focused on the verification of the extent of volume defects depending on the casting temperature of steel and casting speed. The results of numerical simulation of casting and solidification of heavy steel ingot in SW ProCAST showed that there is relatively easy to change the boundary conditions. The decreasing of casting temperature together with longer filling time led to the minimization of central porosity, and also of macrosegregation.

Co-authors: **Karel Michalek, Karel Gryc, Pavel Machovčák, Marek Kováč**