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Study on Temperature Distribution throughout the Continuous Casting Process of Copper Magnesium Alloys

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Abstract : The constant tendency toward the materials properties improvement nowadays creates opportunities for the scientists, and furthermore the manufacturers all over the world to design, form and produce new alloys almost every day. Considering the fact that companies all over the world look for alloys with the highest values of mechanical properties coexisting with a reasonable electrical conductivity made it necessary to develop new materials based on copper, such as copper magnesium alloys with over 2 wt. % of Mg. Though, before such new material may be mass produced it must undergo a series of tests in order to determine the production technology and its parameters. The presented study is based on the numerical simulations calculated with the use of finite element method analysis, where the geometry of the cooling system, the material used to produce the cooling system and the surface quality of the graphite crystallizer at the place of contact with the cooling system and its influence on the temperatures throughout the continuous casting process is being investigated. The calculated simulations made it possible to propose the optimal set of equipment necessary for the continuous casting process to be carried out in laboratory conditions with various casting parameters and to determine basic materials properties of the obtained alloys such as hardness, electrical conductivity and homogeneity of the chemical composition. The authors are grateful for the financial support provided by The National Centre for Research and Development – Research Project No. LIDER/33/0121/L-11/19/NCBR/2020.

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