Optimization of operating parameters of an ingot mold during continuous casting - case of slab a content high carbon

Mounira Bourebia, Sihem ACHOURI, Soumaya MEDDAH, Amel GHARBI, Oualid GHELLOUDJ

Abstract: Currently, the axes research majority aims to improve continually the quality of continuously cast products. Moreover, to guarantee this quality it is necessary to master operating parameters of casting machine, in particular, the primary cooling phase that takes place at level of ingot mold. The latter animated by an oscillatory movement, generally induces marks and defects on slab surface. Indeed, during descent, the solidified crust is in compression, thus creating a negative sliding, this sliding time will help reduce the sticking risk, to close the rips of solid skin and to reduce the depth of oscillation marks. In addition, this time depends on casting speed and oscillation parameters of ingot mold (amplitude and frequency). The aim of this work is to optimize the operating parameters of ingot mold in this case the casting speed "v" and oscillations (amplitude "a", frequency "f") at means of Box-Behnken’s experimental design thus makes it possible to predict the healing rate "τ" which represents the ratio of sliding time and total cycle time. Mathematical model have been obtained and the results show that for the case of carbon steel slab, strong sheet with a thickness of 250mm, it is recommended to use low speeds (v = 0.6m.mm⁻¹) and large frequencies (n = 200cpm) associated with average amplitudes (a = 10mm) to achieve a value of τmax = 0.470 ± 0.048.

Keywords: Healing rate, optimization, experimental design, continuous casting, and primary cooling