Contribution ID: **33** Type: **Oral Presentation**

Mechanism of improving solidification structure of super austenitic stainless steel by feeding strip in a laboratory simulator for continuous casting

Wednesday, 25 September 2024 16:50 (20 minutes)

Feeding steel strip into molten steel in the mold is an effective technique for refining the solidification structure of steel (especially high-alloy steel) during the continuous casting process. This study experimentally investigated the effects of feeding strip on the solidification structure of super austenitic stainless steel S32654 and clarified the relative mechanism by combining numerical simulation. The results revealed that feeding strip noticeably increased the proportion of equiaxed grains, refined the dendritic structure, and improved Mo segregation and the precipitation of σ phase. Feeding strip promoted the formation and survival of a large number of floating dendrites by cooling the molten steel. As the temperature decreased, these floating dendrites underwent repeated splitting, thereby sharply increasing their quantity. Subsequently, these floating dendrites acted as nucleation particles for the equiaxed grains, thus significantly increasing the proportion of equiaxed grains and refining the dendritic structure. Besides, feeding strip apparently reduced the microsegregation of Mo element, which lowered the precipitation temperature and growth time of σ phases. Under such a condition, the σ phases mainly nucleated and grew after complete solidification rather than in the residual liquid phase. Therefore, the slower diffusion and insufficient supply of the Mo element were not conducive to the nucleation and growth of the σ phase. Meanwhile, the dendrite refinement further limited the growth space of the σ phases. Finally, the σ phases in S32654 steel fed with strip were significantly reduced and became finer and more dispersed.

Speaker Country

China

Primary authors: Dr GENG, Yi-feng (School of Materials and Metallurgy, University of Science and Technology Liaoning); Prof. ZHANG, Shu-cai (School of Metallurgy, Northeastern University); Prof. JIANG, Zhou-hua (School of Metallurgy, Northeastern University); Prof. ZANG, Xi-min (School of Materials Science and Engineering, Shenyang University of Technology); Prof. LI, Hua-bing (School of Metallurgy, Northeastern University); Prof. ZHU, Hong-chun (School of Metallurgy, Northeastern University)

Presenters: Dr GENG, Yi-feng (School of Materials and Metallurgy, University of Science and Technology Liaoning); Prof. JIANG, Zhou-hua (School of Metallurgy, Northeastern University)

Session Classification: Session 10

Track Classification: Casting and Solidification of Liquid Metals