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Influence mechanism of feeding on the removal of inclusions and shrinkage cavity defect during electroslag remelting process

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The implementation of the feeding is a crucial and effective technique for preventing the accumulation of inclusions and the formation of shrinkage cavity at the top of electroslag ingot. In this study, a whole process model of electromagnetic-magnetic-flow-thermal inclusion removal with the full coupling of electroslag remelting of H13 die steel was established. The accuracy of the model was verified by comparing the radial distribution of inclusions and the droplet size with the experimental results of 2t H13 electroslag ingot. Based on the analysis of the influence of melt droplet collection, necking and dripping process on the electromagnetic-magnetic-flow-thermal physical field during the electroslag remelting process, combined with the research on the removal and trapping behavior of inclusions, the influence mechanism of the feeding on the trajectory and macroscopic distribution of inclusions was elucidated. Compared to the fact that inclusions are concentrated at the top of the electroslag ingot, there are more inclusions at the edges after feeding. Meanwhile, the position of the molten pool zone that solidifies increased after feeding, ultimately leading to an increase in the position of the shrinkage cavity in the electroslag ingot, which improved the quality of electroslag ingot and further enriched the control theory of electroslag remelting cleanliness.

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