

Accelerated Vacuum Decarburization of Molten Steel by Combination of Oxygen and Metal Oxides

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ABSTRACT

Vacuum treatment is necessary for the production of steel grades with high quality standards. It is used for the final refining of liquid steel in most steel plants.

Changing the thermodynamic equilibrium with increasing pressure is the principle for decarburization and degassing. The kinetics of the thermo-chemical reactions are particularly relevant for an efficient process time.

To increase the decarburization rate during the VOD (vacuum oxygen decarburization) treatment of chrome steel, oxygen can be blown in combination with metal-oxide-powder.

This study shows the kinetic potential of the combined blowing. For this purpose, a thermodynamic tank-model is developed to calculate the effect of the metal-oxide-powder on the mass and energy balance.

Furthermore experiments in a 100 kg vacuum induction furnace and in an industrial VOD unit confirm the accelerated decarburization during combined blowing.