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Effect of the Jet from Top Lance on Slag Foaming Behavior in Basic Oxygen Furnace Process

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In the basic oxygen furnace (BOF) process, excessive foaming beyond the converter capacity is called “slopping”. Slopping reduces iron yield and equipment lifespan. Therefore, it is important to control slag foaming properly. In previous studies, the jet from top lance in BOF process effectively suppressed slag foaming. However, the mechanism that the jet from top lance suppresses slag foaming is unclear, and its quantitative effect has not been reported. To clarify the effect of the jet from top lance on slag foaming, the effects of the number of nozzle holes and lance height on slag foaming were investigated by water model experiments. Experimental results confirmed the foaming suppression effect of the jet. Furthermore, this effect increased with the increase in number of nozzle holes. Slag foaming model was developed considering the foaming suppression effect caused by the entrainment of foaming slag into the jet, and the measured values were generally reproduced. The foaming suppression mechanism of the jet can be explained by the amount of foaming slag entrained into the jet.

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