MODEL STUDY OF GAS-DYNAMIC PROCESS OF SLAG CUT-OFF DURING STEEL TAPPING FROM BASIC OXYGEN CONVERTER

Background. Final processing slag cut-off during the converter steel manufacturing is an important technological operation. Therefore, the development of highly technical means to ensure reduction of the final slag entering the ladle during tapping from basic oxygen converter is considered one of the priorities of improving the steelworks mechanical equipment.

Currently, the work is underway to adjust the equipment that provides the implementation of metal tapping from basic oxygen converters with slag retention by a gas-dynamic influence on it in the taphole of the melting unit.

The impossibility of visual control of gas-hydrodynamic processes in the basic oxygen converter bath is the main prerequisite to use the physical modeling to study the characteristics of this method of the final converter slag cut-off.

Materials and/or methods. This paper presents the results of modeling studies of gas-dynamic converter slag cut-off. The experiments were performed on a laboratory installation, which included a transparent model of the upper part of the basic oxygen converter, made at the scale of 1:5, and equipped with gas-dynamic overlapping system of tapping channel.

Results. In the first phase of laboratory studies the comparative trials of different nozzles were carried out. For each of the three tested nozzles the root angle of the gas plume was installed.

The second stage of laboratory research was associated with the study of the effect of nozzle’s shape and number of holes on the cut-off slag completeness. The efficacy of the gas jet effects on a counter liquid flow in the outlet channel of the converter was estimated.

Conclusion. It has been found that to achieve an effective final slag cut-off it is necessary to provide the required power of the air flow, which exhausts the tapping channel of a steelmaking unit. It is important to achieve the right balance of pressure and flow rate of injected air (or gas), taking into account the geometrical parameters of the basic oxygen converter outlet and nozzle caps, overlapping its channel in the final stages of steel tapping in the ladle.

Keywords: basic oxygen converter, slag, gas, dynamic pressure, cap, nozzle.