One feature of the two-bath furnace which distinguishes it from the open-hearth furnace is that 80% of the heat required by the bath is supplied by the chemical and sensible heat of the pig iron. This requires high-rate refining of the metal, clear organization of labor at the furnace, and minimizing of various types of downtime. Also, the higher (relative to the OH furnace) ferrostatic pressures in the two-bath furnace and the significantly lower (relative to the oxygen converter) power of the oxygen stream results in a higher state of oxidation of the metal and slag in the region of low (less than 0.10%) carbon contents in the metal.

The bath is blown with oxygen with six-nozzle double lances. The degree of oxygen assimilation during the blow is reduced, since the slag-metal interface is constantly shifting due to changes in the rate of carbon oxidation and, thus, the level of the metal. Figure 1 shows the dependence of the duration of the melting and refining periods on the degree of oxygen utilization $\mu$. It is apparent from Fig. 1 that, under actual conditions, the degree of oxygen utilization fluctuates broadly, and that the duration of the above periods depends heavily on $\mu$. A reduction in the degree of oxygen utilization leads to a reduction in the refining rate and, thus, to a reduction in the rate of liberation of chemical heat. The latter in turn increase heat losses and makes it necessary to blow the metal with oxygen at a low carbon content. Here, the output of sound metal is reduced, as is the quality of the useable metal.

Automatic regulation of the position of the heads of the oxygen lances relative to the slag-metal interface makes it possible to increase the degree of oxygen utilization (Fig. 2).

The rate of carbon oxidation in a two-bath steelmaking furnace begins to decrease when a carbon content of 0.45-0.50% is reached in the metal (Fig. 3). Here, there is a marked increase in the metal heating rate (Fig. 4) and an increase in the ratio of the heating rate to the decarbonization rate (Fig. 3, curve 2), which is evidence of an increase in the rate of iron oxidation. The reduction in metal heating rate at carbon contents below 0.20% is due to the fact that the refining period is prolonged somewhat (one or two of the lances are raised before tapping).

Curve 2 in Fig. 4 characterizes the change in the temperature of the metal when all of the lances are raised above the slag: the heating rate decreases with a decrease in the carbon content, and the temperature of the metal falls at carbon contents below 0.20%. The latter is due to the fact that the quantity of heat supplied by carbon oxidation becomes...
The data shown on heating of the metal indicates that the two-bath furnace provides for a certain flexibility in regulating the temperature of the metal by changing the position of the lances relative to the slag-metal interface. However, in the region of relatively high carbon contents (more than 0.50%), this possibility is limited by the fact that the rate at which the metal is heated by carbon oxidation cannot exceed a certain theoretical value – about 100°C per 1% of oxidized carbon; in the region of lower carbon contents, the heating rate can be controlled, but an effort to do so usually involves additional losses of iron. Consequently, in making steel in two-bath furnaces, it is necessary to try to optimize the charge and thereby make it possible to obtain the requisite metal temperature at the prescribed carbon content prior to tapping. As a first approximation, we may use for this purpose an empirical relation describing the dependence of carbon content prior to tapping on...