UDC 669.787:621.783.2

E.V. Gupalo, associate professor, c.t.s.
A.S. Stromenko, graduate student
V.V. Yuashny, student

THE USE OF TECHNOLOGICAL OXYGEN IS IN HEATER STOVES OF ТРУБОПРОКАТНОГО WORKSHOP

National metallurgical academy of Ukraine, Dnepropetrovsk

In the tube-rolling workshops of plants with an incomplete metallurgical cycle for heating of metal there are used heater furnaces, heated by natural gas. Furnaces, as a rule, have high indexes of energy consumption, that it is related to the high not enough temperature of heating of air for burning, imperfection of the modes of heating, wear of fetting and other technical and organizational defects. From a considerable decrease in demand on the products metallurgical plants pass to producing of shallow parties of products, that results in the considerable vibrations of the productivity of aggregates and appearance of surpluses of technological oxygen, which in default of magazine banks, thrown down in an atmosphere.

It is known that efficiency of the use of surpluses of technological oxygen for enriching of air for burning in the heater devices of rental repartition, heated by natural gas, considerably higher, than in the heat aggregates of other workshops of metallurgical plant. Enriching of air by technological oxygen promotes the temperature of burning and coefficient of the use of warmth of fuel (CUWF), and, consequently, and energy effectiveness of heater devices. Energy effectiveness of enriching of air for burning by oxygen is determined by the technical state and work conditions of concrete heater device. These two conditions determine priority of the use of surpluses of oxygen in concrete end users.

As an object of research the area of heating of metal of tube-rolling workshop is chosen section of the productivity of 65 t/hour, equipped by a circular furnace (CF No 1) for heating of billets before punching, circular furnace (CF No 2) for the intermediate heating of cups and furnace with stepping beams (FSB), intended for heating of pipes before a calibrating figure.

For a decision the set problem there are executed calculations of burning for natural gas, CUWF, charges of air and technological oxygen at incineration of fuel with atmospheric air and air, by the enriched oxygen.

The economy of fuel was determined on a formula:

$$E = \left(1 - \frac{\eta_1}{\eta_2}\right) \cdot 100 \text{, \%}, \qquad (1)$$

where η_1 - CUWF of furnace at work on atmospheric air; η_2 - CUWF of furnace at enriching of air for burning by oxygen.

The task of rational distribution for oxygen between consumers was decided by placing of priorities for consumption of oxygen between furnaces. For this purpose there is used coefficient *K*, being attitude of specific economy of fuel (Δb_f, m^3/t) toward the specific expense of oxygen (b_{O_2},m^3/t):

$$Э K = \frac{\Delta b_f}{b_{O_2}}, \% . \quad (2)$$

The rational was understand distribution of oxygen between consumers, at which priority of its use at first gives oneself up to the furnace with the most value of coefficient *K*. Thus a limit is taken into account on the maximally-possible expense of oxygen in this furnace, not defiat work of burner devices.

It is set that than less size of CUWF furnaces at work on atmospheric air, the anymore it increases at enriching of air by oxygen, that provides the large economy of fuel. So, the maximal economy of fuel can be got at the use of oxygen in CF No 2, and the least - in CF No 1. The values of coefficient *K* make: for CF No 1 – 0.127; for CF No 2 – 0.263; for furnace PSB – 0.151. Thus, priority of the use of oxygen has CF No 2. Exactly in this furnace it is necessary to provide incineration of fuel with the maximal enriching of air. Following on priority consumer is furnace PSB. In this furnace it is necessary to use remain of technological oxygen. The last on priority consumer is CF No 1.

Conclusions. There is offered methods of rational distribution of technological oxygen on the consumers of rental workshop, allowing to provide the maximal economy of fuel. On the example of distribution of oxygen between three heater furnaces, characterized by different energy effectiveness, it is shown that the use of the offered method allows to increase the economy of fuel to 78 % as compared to the use of oxygen in the arbitrarily chosen heat aggregate.