RESEARCH OF HEAT EXCHANGE INTENSIFICATION METHODS OF OIL COOLERS 300 MW TURBO PLANT

Mykhailova I., Lytvynenko O., Tarasov A.

National Technical University «Kharkiv Polytechnic Institute», Kharkiv

In most cases of practical application of methods of heat transfer intensification, the developers of heat exchange devices, in addition to meeting technical conditions and ensuring the given performance characteristics of heat exchangers, pursue the following goals: increasing the thermal capacity of the existing heat exchange apparatus without changing the capacity for pumping coolants (or pressure losses) at a fixed consumption of coolants; lowering the temperature pressure between the heat carriers to ensure the given thermal power at fixed dimensions of the heat exchanger; reduction of the dimensions and weight parameters of the heat exchanger while preserving the thermal capacity of the heat exchanger and the level of pressure losses in its tracts; reduction of the power for pumping the heat carrier at a fixed thermal power and preservation of the surface area of the heat exchange.

The purpose of the work is the analysis of heat exchange intensification methods in oil coolers, which are aimed at increasing the heat transfer coefficient and reducing the heat exchange area.

In oil coolers, the intensification of heat exchange is achieved by using the design of partitions of the "disk-ring" type, which also perform the function of directing the flow of oil. As well as designs of oil coolers with longitudinally grooved fins made of steel tape, which are welded to the outer part of the pipe.

The study was carried out for the same initial conditions, namely: oil consumption 75 m^3/g, coolant velocity: oil 1.173 m/s, water 1.264 m/s, and water temperature at the entrance to the oil cooler 33 ^0C.

The basis of the analysis of the use of partitions of the "disk-ring" type is the change of the distance between the segmental partitions h0 from 80 mm to 180 mm, while the ratio of the outer diameter to the inner diameter is 16/14=*const*, the thickness of the segmental partitions is 15 mm.

An increase in the distance between the partitions led to an increase in the heat transfer coefficient by 30%, which led to an increase in the heat exchange surface area by 20 m^2, and as a result, an increase in the dimensions and metal capacity of the oil cooler.

The best thermophysical indicators when using longitudinal ribbed ribbing were obtained for a pipe with a rib outer diameter of 28 mm, a wall thickness of 1.4 mm, a rib ratio of 4.55, the number of grooves - 12, and the total number of ribs on the pipe is 24.

Analyzing the methods of intensification of heat exchange in the oil cooler, for the structure with "disk-ring" partitions, the optimal distance between the partitions is 130 mm, since the lowest hydrodynamic losses on the oil side were obtained, and the heat exchange surface was 55.44 m^2. The use of a design with grooved fins under the same initial conditions allowed to reduce the area of the heat exchange surface by 0.3 m^2.