RESULTS OF INDUSTRIAL CONTROLLED OPERATION OF THE INNOVATIVE MODULAR EXPERIMENTAL INDUSTRIAL PLANT OF BASALT DIRECT-ROVING

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Research goal is to check the main indicators of the designation of the innovative experimental industrial design of a modular plant for the production of basalt continuous fiber (direct-roving) under long-term controlled operation.

Work results include thermal engineering, aerodynamic, energy and technological indicators of the work of the innovative modular installation. The characteristics of reliability of non-standardized equipment, lining, engineering networks and automation systems are presented. The dynamics of parameters of installation assignment during the project period of operation is studied.

Reducing the cost of natural gas and improving the quality of direct-roving is achieved through:

- use of air (as an oxidizer in the reaction of combustion) with a temperature of 800-1100 ^{o}C;
- organization of melting, homogenization, degassing, flow and heat exchange of basalt melt at temperatures up to 1550 ^{o}C;
- control of the temperature field in the lining of the bath melting furnace (with the possibility of forming the cover on the surface of the distribution of "lining-melt basalt");
- hydrodynamic and thermal stabilization of basalt melt parameters in the place of the formation of continuous basalt fiber.

The methods of system intensification of heat-mass-exchange processes of multi-stage heat technology of basalt continuous fiber production, aimed at significant reduction of natural gas consumption and the increase of the quality of direct-roving, and innovative devices for their hardware design, have been developed, constitute the fundamental scientific and technical basis of a new modular installation.

Conclusions

The achieved results allowed to reduce 2 times the consumption of natural gas for direct-roving production in relation to the plants of a modular type. In addition, the average strength of the elemental basalt fiber obtained on the pilot industrial model of the modular installation is 1.2-1.4 times higher than the similar indicator for elementary fibers obtained on existing modular plants.