Abstract

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The purpose of the conducted research was to develop the technology of high-pressure gas quenching of satellite gears of FDGS aircraft engine gears, made of Pyrowear 53 steel and operating under long-term and cyclically varying operating loads.

The research made it possible to determine the technological parameters of the process of low-pressure vacuum carburizing LPC directly combined with high-pressure gas quenching HPGQ and their influence on the phase composition, morphology of microstructure components, mechanical properties, and strength properties of the carburized layer and core of gears made of Pyrowear 53 steel in relation to the traditional approved technological process with quenching in an oil medium.

Studies of the microstructure and mechanical properties of the carburized layers produced were carried out. Microscopic studies included the determination of the phase composition, morphology of the phase components of the microstructure of the carburized layer and the core and determination of the grain size of the primary austenite. The relative volume of residual austenite and measurement of stresses in the layer were determined by X-ray diffraction. Mechanical properties of the core were tested. Tests of mechanical properties included measurement of hardness on the surface and in the gear core, as well as on the cross-section of the carburized layer in the area of the pitch diameter and root diameter of a planetary gear component with a roof toothing.

It was found that the use of high-pressure gas quenching in the technological process of manufacturing gears made of Pyrowear 53 material, makes it possible to obtain drawing parameters in accordance with the design requirements placed on the wheels during operation under cyclically varying service loads.