

# USE OF NANO-TECHNOLOGIES FOR INCREASING THE RUNNING EFFICIENCY AND COMPLEX SAFETY OF THE AIR VESSELS

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*Abstract:* The nano-technological methods of providing safety of aviation transportation means and retention of the airworthiness of air vessels in the process of operation are developed.

*Keywords:* nano-technology, air vessels, gas-pulse working

The Complex safety with the operation of air vessels includes in itself safety of aviation transportation means, safety of passengers and loads, ecological safety. The methods of providing safety of aviation transportation means and retention of the airworthiness of air vessels in the process of operation are developed. The same factors, that they ensure the maintenance of airworthiness (failure-free performance of aviation equipment; organization and regimes of maintenance and repair and others) determine the effectiveness of the use of air vessels, in combination with proper working order of aircraft pool, by the regularity of departures, by information and logistic support with the presence of production-engineering base. The existing practice of the maintenance of air vessels implies in the case of detecting of cracks and other damages of the elements of the construction of aviation equipment to carry out their measurements and, if by regulations is allowed the continuation of operation with the crack of similar sizes, to establish the periods of the following of the checking of technical state. Promising is the methodology, at basis of which lies the combination of the process of diagnosis and treating the region of the revealed crack, first of all its apexes, without by deformation methods. Crack in the article appears after the local inventory depletion of plasticity. Contemporary without deformation nano-technological methods, such, as gas-pulse working, are capable for the short time interval of restoring plasticity and viscosity of material in the region of crack without reduction in its strength properties, of ensuring relieving formed in the process of operation undesirable residual stresses. For restoring the mechanical and performance properties of the elements of the construction of air vessels in the process of maintenance can be used and others without the deformation methods of working, under the conditions a sufficient mobility of equipment and guarantee of restoration of plasticity and viscosity without reduction in the strength properties.

Also methodology implies for the sections of the elements of construction, most inclined, according to the statistical data, to crack formation, to diagnose the increase in the density of the

defects of crystalline structure in the surface layers, which precedes inventory depletion of plasticity and crack formation, which can be fixed, including by indirect methods, for example, by ultrasonic hardness gauge, since it is accompanied by an increase in the hardness. The change the densities of the defects of crystalline structure, which precedes crack formation, can be fixed with respect to a change in the electrical resistance, including by onboard system with the aid of the sensors. The components, subjected to gas-pulse working, possess the increased stability to the dynamic and cyclic loads, increased cold resistance, and also corrosion resistance, thanks to which they contribute to guarantee and retention of the airworthiness of air vessels in the process of operation.

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