

СУЧАСНІ АВІАЦІЙНІ ТЕХНОЛОГІЇ

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THE METHODOLOGY OF CONDUCTING TESTS ON FRETTING AT THE SPHERE-TO-PLANE CONTACT

A lot of test equipment is being currently developed and operated, including machines for testing materials in tension and compression, bending, shear, torsion, wear, impact, devices for determining hardness and elastic constants of materials, facilities for technological tests of materials, climatic factors studies. The development of facilities for conducting the research on wearability of components and individual elements takes priority for different machines and mechanisms operating in severe conditions.

Recently, much of modern literature is dedicated to the questions of development of methodologies of tests on wearability of different coatings and metals. One of the most important directions in increasing of tribotechnical reliability of various machines and mechanisms is the improvement of today's and creation of the new methodologies of testing different design materials on friction and wear. The analysis of the sources shows that in general the most widespread tribological researches are investigated, which include determination of the area of the actual contact, microgeometrical characteristics of friction surfaces and the others. Besides, the information is given on standard methods of tests, which are frequently used, on friction and wear, on the basic schemes of testing, criteria and ways of estimation of tribotechnical characteristics, and also on non-standard methods of testing, their opportunities and specific spheres of usage.

Thus the aim of this work is the development of methodologies of testing the materials and coatings on wearability in conditions of fretting in process of sphere-to-plane contact.

The installation was modified for materials testing on sliding friction on the basis of the installation for testing the materials on fretting (МФК-1). The installation allows conducting comparative tests of steel, alloys, coatings, composite materials in process of sphere-to-plane contact. The essence of the method is that the movable counter sample which touches the immovable cylindrical sample by its end face at a given load is driven by reciprocating rotary motion at specified amplitude and frequency. The peculiarity of the installation is the developed holder, which allows conducting the tests with the real balls 8 mm in diameter. Thus the contact sphere-to-plane is obtained, in which 3 balls simultaneously take place during the tests on fretting. The installation allows to conduct tests in a wide range of loading conditions: frequency – 25-35 Hz; loading $N=10-200$ kg; amplitude – 25-500 mm.

The developed methodology is applied for conducting tests of the friction pair screw-nut in the sphere-to-plane contact. The investigations show wearability of materials ШХ-15 and 30Х2НВФА with the usage of ЭРА lubricant and in the dry way. The results of the conducted tests show that at a dry friction the wearability of nitronized steel 30Х2НВФА is in 8.5 times less than with the usage of ЭРА lubricant.

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