SEAE 21P **IMPROVEMENT OF WEAR RESISTANCE OF OT4 TITANIUM ALOY BY ELECTROSPARK ALLOYING**

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Antifriction and anti-wear properties of titanium alloys are low, which to a great extent restricts their application in friction units. The purpose of the study was to increase the wear resistance of the OT4 titanium alloy by strengthening it with different materials using electrospark alloying (ESA).

Samples of OT4 were subjected to ESA electrodes of graphite (in various modes of doping), to molybdenum and T15K6 hard alloy using an EFI-10M industrial unit. Tribological tests of the coatings were carried out in a tribological laboratory of the Aleksandras Stulginskis University (Kaunas, Lithuania) using an upgraded friction machine SMC-2. All of the samples were tested for friction and wear with steel 45 HRC 50-52 discs at the loads of 900 and 1200 N in 15W-40 engine oil. In addition, the disc of a diameter d = 35 mm rotated at a rate of 600 rev/min. Two or three samples were tested for each coating. A sliding distance of 30000 m was taken as a basis. The testing started at a load of 100 N, with the load increased by 100 N each minute. Thus, during 8-11 minutes the load reached the operating values of 900-1200 N.

The wear of the samples was determined by weighing then on the electronic scales with an accuracy up to 0.1 mg. After the wear tests, the worn surfaces of the samples (which had the shape of segments) and discs were profilographed using a Mahr GmbH Gottigen Typ ST 500 profilograph and microimages were taken at a NICON ECLIPSE MA-100 optical microscope. Microhardness of the coatings was determined using a PMT-3 microhardness tester.

Testing the coatings at a load of 900 N showed that under this load three coatings were the most wear resistant, namely, the coating from OT4 + T15K6 + graphite (the energy of a single electrical discharge - W=0.3…0.9 J), the coating from OT4 + graphite (W=3 J) and the coating from OT4 + graphite (W=0.9 J). However, the most optimal friction couple was the coating from OT4 + graphite (W=0.9 J) with the steel 45 hardened disc, since it damaged the disc (U_{disc} = 33 mg) least. At a load 1200 N, the coating from OT4 + T15K6 + graphite (W=0.3…0.9 J) was the most wear resistant, but it damaged the disc (U_{disc} = 264 mg) very much. While the coating from OT4 + graphite (W=0.9 J) damaged the disc (U_{disc} = 47mg) least of all, and taking into account that the wear of this coating was just by 33% higher than that of the coating from OT4 + T15K6 + graphite (W=0.3…0.9 J), we can definitely state, that at a load of 1200 N the coating from OT4 + graphite (W=0.9 J) was also the most optimal.

It is shown that all materials used for the electrospark doping of the OT4 titanium alloy improved the wear resistance of the titanium alloy from $5.03 \cdot 10^5$ to $1 \cdot 10^6$ times (at a load of 900 N), and from $2.67 \cdot 10^5$ to $6.24 \cdot 10^6$ times (at a load of 1200 N).

It was found that the increase of the wear resistance of the OT4 titanium alloy occurred due to the increase of microhardness on the alloyed surface because of the formation of titanium carbides.

It was shown that the most optimal friction couple (under all of the loads of the tribological tests) was the coating from OT4 + graphite (W = 0.9 J) with the disc from steel 45.

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