TEMPERATURE RISE OF NITROGENATED DIAMOND-LIKE CARBON DURING SLIDING: CONSIDERATION OF REAL CONTACT AREA

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KEYWORDS
real contact area; height distribution; diamond-like carbon

ABSTRACT
The real contact area of the nitrogenated diamond-like carbon [1] against the alumina ball during sliding was evaluated in order to obtain precise data for the temperature rise model at the interface. The temperature distribution at the interface is a crucial parameter, as the mechanical properties of DLCs will be degraded above 400℃ due to the structural changes [2]. Yamamoto et al. estimated that the temperature at the steel/DLC interface can rise up to 560 ℃ using the numerical model [3] based on the frictional energy approach[4]. The numerical model also showed dependence of the interface temperature on the real contact area. Hence, it is important to evaluate the real contact area during sliding process, so that more precise temperature profile is obtained by the simulation [5]. However, most of the real contact area mechanisms have been discussed using static condition [6-7]. In this work, The 3D surface profiles of the wear tracks after ball-on-disk test (RHESCA FPR-2100) were obtained by the laser microscope (OLS4000 OLYMPUS). The overall height distribution of the surfaces asperities was obtained before (Fig. 1a) and after (Fig. 1b) the tribo test. The evolution of the average and the standard distribution of asperities has been evaluated, and used in the improved numerical model using frictional energy approach.

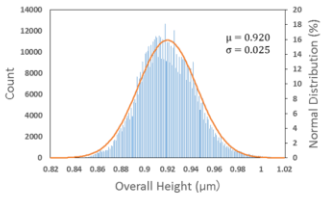

Fig. 1 (a) Overall height distribution before tribo-test: Nitrogenated DLC

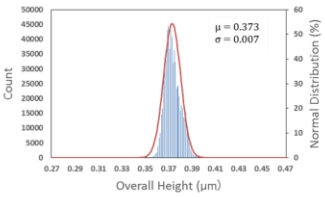

Fig. 1 (b) Overall height distribution after tribo-test: Nitrogenated DLC

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