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EXPERIMENTAL INVESTIGATION OF SURFACE ROUGHNESS AND WEAR IN SLIDING FRICTION

O.Linins, A.Kamols, I.Boyko

*Riga Technical University, Mechanical Engineering Institute, Ezermalas 6k, LV-1006,
Riga, Latvia*

For qualitative evaluation of the wear process the intensity of linear wear is commonly used, which may be determined separately for the plastic and elastic contact. For determination of the contact type we propose to use an original contact criteria (CC): $CC = S_m \cdot \Theta \cdot H / R_a$, where R_a and S_m are the parameters of a surface roughness; H is the micro hardness of a surface layer; $\Theta = 1 - \mu^2 / E$ is the elasticity characteristic of the material (E is the Young's modulus and μ is the Poisson's ratio). For a practical evaluation of the separate parameters interaction and their influence on the wear intensity the experimental investigations were fulfilled on a friction-testing machine according to the scheme of end face of pin and disc. For results reliability the wear of samples was determined by: 1) 3D measurement of artificial data levels (bases); 2) micrometry of samples; 3) weighing. Results of these experiments demonstrate that during running-in process H decrease. At the same time, CC increases with running in of surfaces. It means that in the first working period mainly a plastic deformation of surfaces occurs (up to $CC = 0.7$), then an elastic-plastic deformation take place ($CC = 1.7$), and at a normal exploitation regime ($CC > 1.7$) an elastic deformation of asperity occurs, which provides a minimum wear intensity. Thereby complex studies of the wear and roughness parameters of the friction surfaces were carried out. The proposed CC is suitable for direct engineering calculation and is correct for all types of roughness. Using of CC allow to select roughness parameters and technological processing on drawing with prediction of the type of the contact.

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