ON THE VALIDITY OF THE PRESSURE-VELOCITY CRITERION FOR THE PURE SLIP SCUFFING

FOMIN Michaela[1], MUSCĂ Ilie[2]

[1,2] Department of Mechanics and Technologies, University Stefan cel Mare, Suceava, ROMANIA,
[1]*fomin_michaela@yahoo.com*, [2]*iliem@fim.usv.ro*

Abstract: *In scuffing conditions, the value of the product of the hertzian pressure of contact and the sliding speed generally remains constant. The experimental results reveal that the micro-topography of the contact area has also a determining role in the evolution of the wear and tear and the emergence of severe damages with high scuffing risk The experimental researches and fitting analysis presented in this paper reveals a good validity of the pressure-speed criterion also in the case of the pure slip conditions of experiments.*

Keywords: *scuffing, roughness, shear stress, criterion pv.*

Introduction

Scuffing is a possible catastrophic damage of the lubricated contacts, characterized by a progressive development of the adhesion until it is extended over the entire area of contact. The present researches reveal a relative low degree of predictability, caused by the insufficient understanding of the context of initiating a precursory phenomenon of the phenomenological adhesion. It was revealed that, phenomenologically, scuffing depends on many variables, such as: materials, properties, surfaces, micro-topography, preparation methods and processes, load, lubricant, etc.

Scuffing occurrence is always characterized by the occurrence of the lubricant film's destruction, but most studies present in literature have examined scuffing from other points of view such as material properties, superficial layers' properties, kinematic and dynamic conditions, but less correlated with lubricant's ability to generate lift and a permanent film into the contact.

However, less studied it was the influence of the processes taking place inside the film of lubricant due to the specific conditions of operation on scuffing.

Experimental research [1], [2], [3], reveals a constant correlation of the moment of initiation of the scuffing with the pressure and the relative speed of the contacts, this phenomenon occurring for high pressures at lower speeds, or at higher speeds for lower pressures, fact that induces the idea that the rheological behavior of the lubricant plays an essential role.

The lubricant flow behavior can be revealed by assessing their manifestation in contact, simultaneously with the external conditions to which it is subjected. Due to speeds' accommodation, the lubricant in a lubricated contact is sheared in the presence of pressure.

In order for a contact, lubricated in hydrodynamic (HD) or elastohydrodynamic (EHD) conditions, to be governed by the Reynolds equation, it is necessary for the lubricant to manifest viscous properties, which means that the shear stresses occurring in the lubricant film needs to be directly correlated with the shearing gradient. Many experimental studies revealed that the sheared