

MACRO-MICRO ANALYSIS OF GEAR SCUFFING TESTS USING A MIXED FILM LUBRICATION MODEL

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ABSTRACT

Gear scuffing tests were performed in a FZG test rig in order to evaluate the influence of several parameters, such as, the operating conditions (torque, speed and oil bath temperature), gear geometry and base oil viscosity. A mixed film lubrication model was developed for the analysis of gear teeth flank contact, through the conjugation of a full film ehd lubrication model (ehd problem between rough surfaces) and a boundary film lubrication model (dry contact problem between rough surfaces), using a load share function. The mixed film lubrication model was used to determine the normal pressures, shear stresses and local friction coefficients in several points along the gear meshing line, for each load stage and for all the gear scuffing tests performed. The analysis at the micro-contact level was used to complete the scuffing study performed with global contact parameters, explaining the occurrence of scuffing during “running-in”, justifying the zones in teeth flanks where the first scuffing marks appear and supplying indicators for low scuffing resistance at high oil bath temperatures.