

INVESTIGATION OF MICROPITTING OCCURRENCE FOLLOWING CRACK PROPAGATION UNDER E-AXLE LUBRICANT

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KEYWORDS

Rolling contact fatigue; Wear; Surface topography, Micropitting

ABSTRACT

Micropitting is a type of fatigue wear damage occurring on the tooth flanks. Occurrence of micropitting is major concern as it could potentially result in serious failures, especially for motors and gears used at high rotational speed in e-axle.

In this study, fatigue tests were conducted using a triple-contact friction tester to investigate the generation and growth mechanisms of micropitting under e-axle lubricants by varying the number of contact cycles under rolling sliding conditions.

We observed surfaces and cross-sections of roller specimens and found micropittings from 8.6×10^5 contact cycle (Fig. 1, Fig. 2). Damaged area percentage (DAP) increased with the number of contact cycles (Fig. 3). These damages were found to be due to fatigue. Based on cross-sectional images, we considered a mechanism for the occurrence of micropitting. Cracks start to propagate at a shallow angle to the surface, upon reaching a certain depth, become parallel to the surface. Then branching cracks reach the surface, remove fragments and form micropittings.

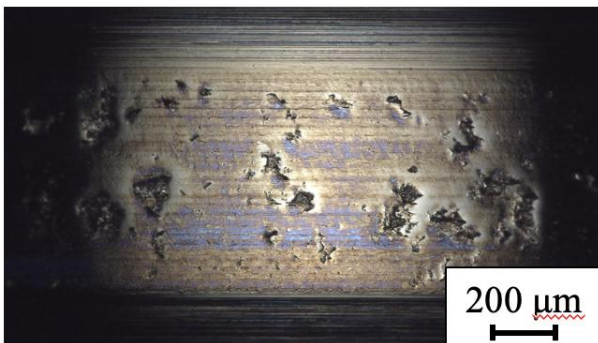


Fig. 1 Roller surface at 8.6×10^5 contact cycle

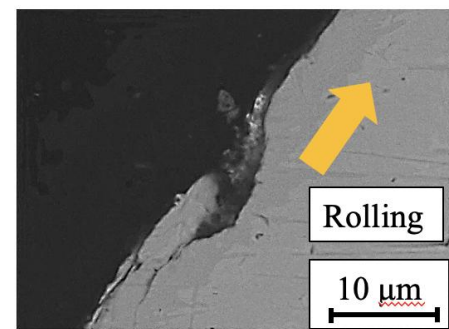


Fig. 2 Cross-section of the roller at 2.6×10^6 contact cycle

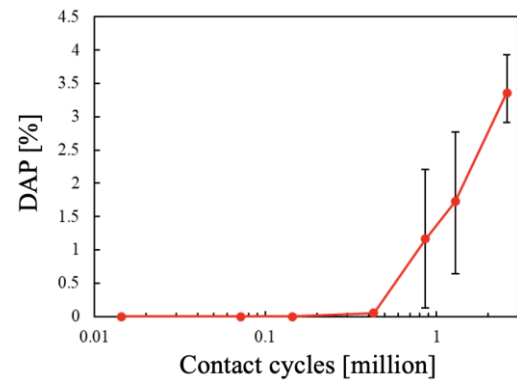


Fig. 3 Development of DAP

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