EFFECT OF LASER SURFACE TEXTURING ON FRICTION BEHAVIOUR OF LUBRICATED POINT CONTACT UNDER DIFFERENT SLIDING-ROLLING CONDITIONS

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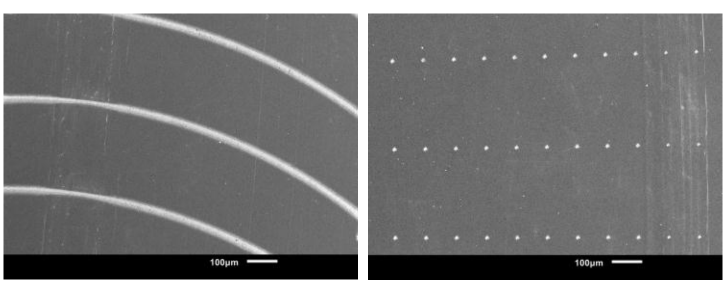
KEYWORDS

Friction; Laser Surface texturing; Gears

ABSTRACT

The interest in internal combustion engine (ICE) fuel economy has been raised in the last years due to stricter pollutant emission standards [1]. Surface topography modification could promote friction and wear reduction. Particularly, the Laser Surface Texturing (LST) technique has been largely investigated in the last two decades and several optimal texture configurations have been proposed to improve the tribological performance of lubricated sliding contact interfaces, especially in ICE tribosystems [2]. In contrast, the effectiveness of using LST for friction and wear reduction has not been widely explored for components with concentrated contacts and operating under varying sliding-rolling conditions, such as in gears and cam-tappet applications.

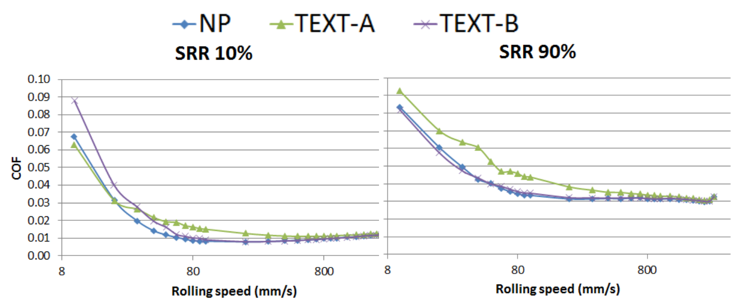
In this context, the present contribution is aimed at scrutinizing the effect of LST on friction behaviour of EHL point contacts subjected to different slide-to-roll ratios. The influence of texture shape, orientation, distribution and density were investigated and compared with a reference, untextured sample, see Fig.1.



(a) (b)

Fig.1 Laser surface texture configurations: (a) radial curved grooves and (b) aligned dimples pattern.

Friction tests were conducted in a MTM2 (Mini-Traction Machine) tribometer for two SRR conditions (10% and 90%) covering a range of rolling velocities representative of gear teeth contacts of automotive transmissions. Preliminary results were collected in the Stribeck curves depicted in Fig. 2, showing that surface texture could promote both positive and detrimental effects on friction; therefore, other texture configurations are being designed for a more in-depth evaluation of their influence on friction.



(a) (b)

Fig.2 Stribeck curve for SRR 10% (a) and 90% (b). Untextured samples (NP) and in textured samples (TEXT-A: radial curved grooves, TEXT-B: aligned dimples pattern).

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