Wear

Volume 241, Issue 2, 31 July 2000, Pages 193-203

Automobile engine tribology â€” approaching the surface

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https://doi.org/10.1016/S0043-1648(00)00375-6

Abstract

There has been relentless pressure in the second half of the 20th century to develop ever more fuel efficient and compact automobile engines with reduced environmental impact. From the viewpoint of the tribologist this means increasing specific loads, speeds and temperatures for the major frictional components of the engine, namely, the piston assembly, the valve train and the journal bearings, and lower viscosity engine oils with which to lubricate them. Inevitably, this leads to decreasing oil film thicknesses between the interacting surfaces of these components and a more crucial role for the topography and surface profile of the two surfaces in determining tribological performance. This paper reviews the nature of the surfaces encountered in the piston assembly, valve train and journal bearings of the internal combustion engine and how mathematical models of engine tribology are endeavouring to cope with the extreme complexities the incorporation of surface topography potentially brings. Key areas for future research and the implications for design are highlighted.

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Keywords

Automobile; Engine; Tribology; Piston; Piston ring; Cylinder; Engine bearings; Cam; Follower; Valve train; Friction; Lubrication; Wear

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