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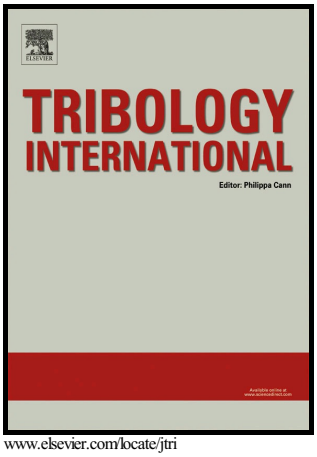

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Comparison of the scuffing behaviour and wear resistance of candidate engineered coatings for automotive piston rings

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Abstract: Continuous optimization of advanced coatings is required to achieve technology advances and strict emission standards in automotive systems. Integration of conventional ceramic coatings and hard amorphous graphite-like carbon (GLC) with low friction is an economically feasible way of achieving superior efficiency of oil and durability as well as scuffing resistance. This work evaluates the scuffing resistant capacity and durability of engineered coating materials. The presence of GLC not only combats the scuffing damage and running instability effectively for conventional chromium-based coatings, and also improves the reliability and robustness of the piston rings. The scuffing mechanism of the engineered rings with and without GLC surface will be discussed by the observation of the damaged characteristics and the chemistry of the rubbing parts. This will potentially benefit to optimize the coating material in the piston assembly of engine.

Keywords: Scuffing; Surface coatings; Piston ring/cylinder liner; Engine.

1. Introduction

The ever-increasing power output of engines has been continuing today, this allows the moving assemblies to run under severer mechanical and thermal loading especially in the engine piston system [1, 2]. As the piston ring/cylinder liner part dominantly operates in mixed/boundary lubrication regimes, which cannot be separated effectively by the lubricating film, the piston ring/cylinder pair is more prone to wear and scuffing when subjected to elevated temperatures

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