

IMPACT OF SURFACE TEXTURE ON FRICTION PERFORMANCE OF CRANKSHAFT BEARINGS

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KEYWORDS

Belt texturing; Laser texturing; Crankshaft bearings; Surface texture.

ABSTRACT

Surface modifications and texturing in engine components is among valuable tribological solutions to the challenge of meeting more stringent energy efficiency requirements and environmental legislation [1]. This solution was interested Scientifics and industrials in last decade particularly for reducing friction losses at the piston ring and cylinder liner interface. It has led to the emergence of various honing finishing processes (plateau honing, helical slide honing...) and the proposition of alternative texturing process (laser texturing...). Nonetheless, for the journal bearing of the crank train in an automotive engine, second source of friction losses, there are not enough experimental results to confirm the improvement of texturing and its optimal features characteristics.

This paper is focused on the study of the impact of surface texture in the crankshaft bearings system for an automotive engine. Then, several surface textures and morphologies of a main crankshaft bearing are considered (Fig.1). They are generated respectively by conventional belt finishing [2], structured belt texturing [3] and hybrid laser texturing. Non textured "Mirror" smooth surface is also considered as reference.

Friction performance and durability of each crankshaft surface texture was evaluated by instrumented journal-bearing test-rigs under both static and dynamic loads experiments. Scuffing torque, scuffing temperature, minimal friction and Striberg curve was then determined. The wear losses evolution of both crankshaft and pin was analyzed at different angular position after 15h, 30h and at seizure based on microscopic

observations and topographic measurements.

Results highlight some potential geometrical specifications to consider to achieve reliable low friction bearings.

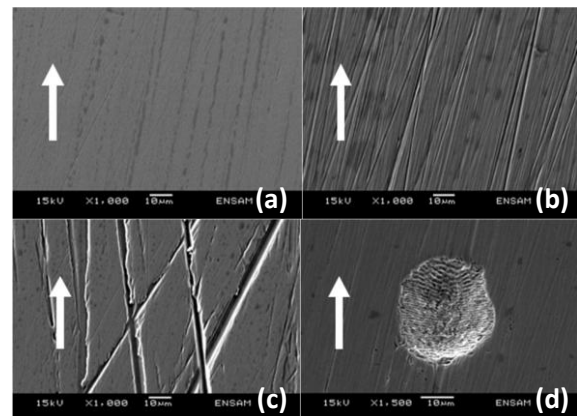


Fig.1 "Mirror" smooth surface (a) and crankshaft surface textures generated by conventional belt finishing (b), structured belt texturing (c) and laser texturing (d).

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