

Dynamic Simulation for Surface Wear Prognosis of the Main Bearings in the Internal Combustion Engine

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Abstract : The wear character of the main bearing is one of the critical indicators for the overhaul of an internal combustion engine, and the aim of this paper is to reveal the dynamic wear mechanism of the main bearings. A numerical simulation model combined multi-body dynamic equations of the engine, the average Reynolds equations of the bearing lubricant, asperity contact and wear model of the joint surfaces were established under typical operating conditions. The wear results were verified by experimental data, and then the influence of operating conditions, bearing clearance and cylinder pressure on the wear character of selected main bearings were analyzed. The results show that the contribution degree of different working conditions on the wear profile and depth of each bearing is obviously different, and the increase of joint clearance or cylinder pressure will accelerate the wear. The numerical model presented can be used to wear prognosis for joints and provide guidance for optimization design of sliding bearings.

Keywords : dynamic simulation, multi-body dynamics, sliding bearing, surface wear

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