激光微造型凸轮副的摩擦磨损 Friction and Wear of Cam with Laser Micro-texture under Lubrication

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关键词： 凸轮 激光微造型 几何形貌 摩擦学性能

摘 要： 采用UMT-2多功能摩擦磨损实验机，模拟内燃机凸轮/滚轮工况条件，考察了多种激光微造型形貌试样表面的摩擦磨损特性。实验结果发现，与未处理光滑表面相比，激光微造型试样表面的耐磨、抗擦伤性显著提高，其中，凹坑造型表面的摩擦因数显著下降，而凹槽表面的摩擦因数相对较大。这说明凹槽形貌会增大表面摩擦，而凹坑形貌具有一定的减摩效果。合理选择凹坑的深度及其面积占有率，并进行微形貌几何参数的优化组合，可达到最佳减摩效果。 Steel-45 surface was treated as micro-texture (groove patterns and concave patterns) by using laser micro-texturing technology. Friction and wear properties of the textured samples were examined by using an UMT-2 wear tester in cam/roller simulation work condition. As the results, the laser micro-texturing surface was significantly improved in the anti-scuffing property and wear resistance compared with the conventional smooth surface. The textured surfaces with groove patterns had higher friction coefficients than the conventional smooth surfaces, while the textured surfaces with concave patterns had lower friction coefficients than the conventional smooth surfaces. The results indicated that the groove patterns on the working surface increase friction and the cavity patterns on the working surface can reduce friction. It can be concluded that an optimal friction reduction effect of the textured surface can be obtained by choosing a suitable concave depth and the ratio of the projected area of the concaves with the total area of the working surface.

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