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The Surface Texturing of SCM 415 Steel by Using Electrical Discharge Machining and Ion Beam Etching MethodsJung-Dae Kwon¹, Seong-Hwan Yun², Seunghun Lee², Do-Geun Kim², Jong-Kuk Kim²¹Korea Institute of Materials Science, Changwonsi, South Korea ²Korea Institute of Materials Science, Changwon, South Korea

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Surface morphology influences the friction and wear damage at the surface. The effective results of texturing for tribology application were obtained by machining, ion beam texturing, and etching technology. A tappet is the part of a rocker arm which makes contact with an intake or exhaust valve stem above the cylinder head of an internal combustion engine. So the surface of tappet has to be a low friction characteristic. The surface of SCM415 steel, a material of tappet, was treated with the electrical discharge machining (EDM) and ion beam etching by using filtered vacuum arc source. The surface roughness (Ra) was measured by using surface profiler and the surface image was observed by using field-emission scanning electron microscope (FESEM). First, the SCM 415 steel was mechanically polished to have the roughness of Ra=0.4 μm . After an EDM treatment, the surface of SCM 415 steel have bumps with the diameter of 60~100 μm and the roughness (Ra) of 2.2~3.8 μm . In addition, the surface with bumps was etched by using argon ion in accordance with a substrate voltage and etching time. As the etching time was increased, the shape of a certain bump was sharpened and a lot of nano-sized bumps were formed at the surface of the micro-sized bump. And then the surface roughness was increased and as the treatment time increased.

Keywords

Surface
Texturing
Tribology
Etching
Ion beam