

# Frictional properties of surface textures fabricated on hardened steel by elliptical vibration diamond cutting

Zhang, Jianguo

Zhang, Junjie

Rosenkranz, Andreas

Suzuki, Norikazu

Shamoto, Eiji

Surface texturing is a promising approach to tailor friction and wear between rubbing surfaces in mechanical components. In this study, surface textures with different geometries and shapes were fabricated on hardened steel by elliptical vibration cutting using a single crystal diamond tool. Special emphasis was laid on the manufacturing technique to fabricate micro/nano surface textures with high accuracy and reproducibility. Subsequent pin-on-disk sliding tests under lubricated conditions were carried out to evaluate the frictional performance of these surface textures, which demonstrated that the frictional force can be efficiently reduced by dimple-like textures. It was also found that the texture's shape and morphology have a significant impact on the tribological performance of textured surfaces. The present work sheds light on a promising and innovative technique to manufacture surface textures to design friction and wear in mechanical elements actively.