

## Improving Lubrication Efficiency at High Sliding Speeds by Plasma Surface Texturing

**Authors :** Wei Zha, Jingzeng Zhang, Chen Zhao, Ran Cai, Xueyuan Nie

**Abstract :** Cathodic plasma electrolysis (CPE) is used to create surface textures on cast iron samples for improving the tribological properties. Micro craters with confined size distribution were successfully formed by CPE process. These craters can generate extra hydrodynamic pressure that separates two sliding surfaces, increase the oil film thickness and accelerate the transition from boundary to mixed lubrication. It was found that the optimal crater size was 1.7  $\mu\text{m}$ , at which the maximum lubrication efficiency was achieved. The Taguchi method was used to optimize the process parameters (voltage and roughness) for CPE surface texturing. The orthogonal array and the signal-to-noise ratio were employed to study the effect of each process parameter on the coefficient of friction. The results showed that with higher voltage and lower roughness, the lower friction coefficient can be obtained, and thus the lubrication can be more efficiently used for friction reduction.

**Keywords :** cathodic plasma electrolysis, friction, lubrication, plasma surface texturing

**Conference Title :** ICAMAME 2019 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering

**Conference Location :** Tokyo, Japan

**Conference Dates :** November 11-12, 2019