Self-Competing and Coupled Effect of Laser Engraved Counterface Groove Depth, Density and Directionality on Wear of Alumina PTFE

CATEGORY OR KEYWORDS
Wear; Alumina PTFE; Roughness; LST; Self-competing effect

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INTRODUCTION
Recent works found lapped counterface roughness perpendicular to the sliding direction could significantly improve debris retention and reduce the wear of an alumina PTFE solid lubricant by 70%. In this paper, we aimed to test the independent effects of roughness groove depth, density and directionality on debris retention and wear performance of a well-studied alumina PTFE solid lubricant using laser textured counterfaces. Grooves were textured parallel or perpendicular to the polymer’s sliding direction and with independently varied depth and interval. A new surface directionality parameter was defined to quantify surface directionality before and after the wear test (Figure 1).

The results suggested both groove depth and interval have self-competing effect on wear due to the in-situ grounding of the counterface topography during sliding. Groove direction, surface directionality and wear are also strongly correlated (Figure 2). A conceptual framework was proposed to illustrate the relations between counterface texture, polymer wear, surface directionality and counterface abrasion [1].

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