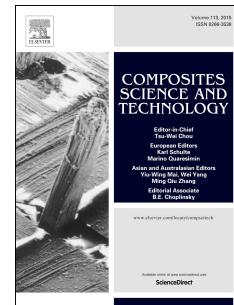


Accepted Manuscript

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PII: S0266-3538(16)31893-0

DOI: [10.1016/j.compscitech.2017.03.011](https://doi.org/10.1016/j.compscitech.2017.03.011)

Reference: CSTE 6696

To appear in: *Composites Science and Technology*

Received Date: 5 December 2016

Revised Date: 5 March 2017

Accepted Date: 9 March 2017

Please cite this article as: Panda JN, Bijwe J, Pandey RK, Attaining high tribo-performance of PAEK composites by selecting right combination of solid lubricants in right proportions, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2017.03.011.

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Attaining high tribo-performance of PAEK composites by selecting right combination of solid lubricants in right proportions

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Abstract: In the present study, tribo-potential of a combination of two solid lubricants (SLs) viz. a special graphite i.e. thermographite (TG) and hexa boron nitride (hBN) in a series of composites with fixed amount of short glass fibers (GF 30 wt. %) and Polyaryletherketone (PAEK- 50 wt.%) was investigated under severe operating condition (Load 900N (Pressure-28 MPa), speed >1.6 m/s) against mild steel disc till the composites failed. All the composites showed excellent performance under very high PV (pressure and velocity) values and the performance depended mainly on operating parameters and amount of two SLs in the composites. It was observed that 20 % of a single SL (either TG or hBN) did not show very good results, although TG inclusion proved better than hBN. When these two SLs (20 %) were used in combination, synergistic effect was observed and best performance was exhibited by a composite containing 5 % hBN and 15 % TG with the highest PV limits of 102.2 MPa m/s (900N, 3.65 m/s) along with very low μ (0.04) and specific wear rate ($5.68 \times 10^{-16} \text{ m}^3/\text{Nm}$), followed by composite with 10 % TG and 10 % hBN. Combination of 15 % hBN and 5 % TG stood next in performance. Synergism in tribo-performance due to combination of two SLs was reported for oils and friction materials but not for high performance anti-friction materials. Such composites have excellent potential as materials for dry bearings, gears etc. The Scanning electron microscopy (SEM) and Energy Dispersive X-ray analysis (EDAX) studies on worn surfaces proved beneficial to understand how the fiber-matrix bonding was affected due to different combinations of SLs and how it affected wear performance.

Keywords: Polymer-matrix composites (PMCs), Friction/wear, Polymers, Synergism

INTRODUCTION

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