

## Role of Amount of Glass Fibers in PAEK Composites to Control Mechanical and Tribological Properties

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**Abstract :** PAEK (Polyaryl ether ketone) being a high-performance polymer, is currently being explored for its tribo-potential by incorporating various fibers, solid lubricants. In this work, influence of amount (30 and 40 %) of short glass fibers (GF) in two composites containing PAEK (60 and 50 %) and synthetic graphite (10 %) on mechanical and tribological behaviour was studied. The composites were developed by injection molding and evaluated in adhesive wear mode (pin on disc configuration) against mild steel disc. The load and speed were selected as variable input parameters while coefficient of friction ( $\mu$ ), specific wear rate (K0) and PVlimit (pressure  $\times$  velocity) values were selected as output parameters for performance evaluation. Although higher amount of GF lead to better mechanical properties, tribological properties were not in tune to this. Overall,  $\mu$  and K0 for both composites were in the range 0.04-0.08 and  $3-8 \times 10^{-16}$  m<sup>3</sup>/Nm respectively and decreased with increase in applied PV values till failure was observed. PVlimit was indicated by 112 and 100 MPa m/s. Such high PVlimit values are not reported for any polymer composites running in dry conditions in the literature. The mechanical properties of the C40 composite (40 % GF) proved superior to C30 composite (30 % GF). However, all tribological properties of C40 were inferior to C30. It exhibited higher  $\mu$ , higher K0 and slightly lower PVlimit value. The higher % fibers proved detrimental for tribo-performance and worn surface analysis by SEM & EDAX was done on the discs & pins to understand wear mechanisms.

**Keywords :** PAEK composites, pin-on-disk, PV limit, friction

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