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Opinion Article

Short Note on the Tribological Behavior of Metals

Ali Jabbary*

Department of Computer Science, National Institute of Technology Kurukshetra, Kurukshetra, India

ABOUT THE STUDY

Aluminum based Metal Matrix Composites (MMCs) are ductile, highly conductive, lightweight, and have a high strength-to-weight ratio, making them suitable for structural applications in the aircraft and automotive industries. The wear and friction behavior with different volume ratios of multi-walled carbon nanotubes and silicon carbide reinforcement was studied by the stirring casting method and the subsequent die casting method. A pin on disc device was used to perform wear tests on the prepared samples. Composites have been found to have lower wear rates and lower coefficients of friction under mild wear conditions compared to aluminum. It can adversely affect the wear resistance of aluminum alloys. Also, the hardness of the composite was increased by increasing the volume percent of the reinforcement.

A composite material consisting of a mixture or combination of two or more distinctly different materials can be used and its properties in a particular application are superior to those of the starting material. Metal Matrix Composites (MMCs) have significantly improved properties compared to non-reinforced alloys, such as high specific strength, modulus of elasticity, damping capacity, and excellent wear resistance. Aluminum alloys are used in many engineering applications due to their light weight and high strength. However, it's low hardness and, as a result, its low wear resistance, limits its use in some applications. Aluminum Metal Matrix Composites (AlMMC), including particulate matter, are considered a promising solution for imparting better wear resistance to aluminum alloys. It has been reported that the addition of silicon carbide and alumina to aluminum alloys improves wear resistance. Various other types of reinforcements such as aluminum nitride, granite, aluminum garnet, glass, beryl, boron carbide, titanium dioxide, aluminum diboride, are also effective in improving the frictional properties of aluminum-based alloys. It has been reported as a reinforcing material. Due to the high hardness and strength of the reinforced phase, it has been reported that the wear resistance improves as the content of the reinforcing material increases. Recently, research has expanded to assess the effect of nanoparticles on the wear resistance of aluminum and its alloys. One of the promising nano-reinforcing materials was Carbon Nanotubes (CNTs), which exhibit very good mechanical properties. Few studies have reported improved wear resistance of aluminum as a result of the addition of CNTs. Produced a CNTs reinforced aluminum composite by infiltrating aluminum preformed in an atmosphere at without pressure. They found that the CNTs were well dispersed and embedded in the Al matrix, the coefficient of friction of the composite decreased with increasing volume fraction of CNTs, and the wear rate of composites decreased steadily with increasing CNT content.

CONCLUSION

Several previous studies related to aluminum investigated the effects of some additives on the tribological performance of. Studying the tribological properties of ester-based additives in various types of copper alloys, there are significant changes in tribological behavior that are clearly related to both the chemistry/composition of the lubricant and the type of alloy. We find that materials used in aerospace applications need to meet certain criteria. The exact amount the breakdown of required properties depends on the particular property, such as specific application, low density. High performance, wear resistance and corrosion resistance industry.

Correspondence to: Ali Jabbary, Department of Computer Science, National Institute of Technology Kurukshetra, Kurukshetra, India, Tel/Fax:+44 (0)300 019 6175; E-mail: stali.jabbary@urmia.ac.ir

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