

STUDY OF TRIBOLOGICAL CHARACTERISTICS OF Cu-Al₂O₃ MMC PREPARED BY POWDER METALLURGY

Name of Student : Gaurav Garg (100377680839)

Deptt. : Production

Guide : Iqbal S. Sharma

Mode of Study : P. Time

ABSTRACT

In the present research work, properties of copper reinforced with alumina in varying percentage of 5%, 9% and 13 % have been investigated in order to get an idea about the effect of reinforcement on tribological characteristics. Copper powder is mixed with alumina in varying percentage by volume and compressed in die using Universal testing machine, followed by sintering in electrical furnace at temperature of 850°C for 1 hour and furnace cooled. Mechanical properties are investigated by checking the hardness and wear test on pin on disk wear testing machine. Characterization had been performed through SEM, XRD and EDS.

Hardness results showed the increase in Rockwell hardness value from 65 HRB to 85 HRB with increase in alumina content from 5% to 9 %. Wear test results show that wear rate is also improved from $.000084982 \times 10^5 \text{ mm}^3/\text{Nm}$ to $.000070413 \times 10^5 \text{ mm}^3/\text{Nm}$ with increasing amount of alumina from 5% to 13% at a load of 30 N, but when load is increased to 60 N there is considerable variation in wear rate from $.000062254 \times 10^5 \text{ mm}^3/\text{Nm}$ to $.00010316 \text{ mm}^3/\text{Nm}$ which may be due to the vibrations involved during wear testing at high loads.

SEM micrographs confirmed that alumina is uniformly scattered all along the matrix but intensity of distribution is increased by increasing alumina content. EDS has also been performed to know the elemental details which shows the presence of cuprous oxide at higher temperatures which will lead to decrease the hardness. XRD analysis showed that all major peaks belong to copper with minor presence of Alumina and cuprous oxide.