

On Copper-Graphite Functionally Graded Material Applied to Journal Bearings

Prof. Mahmoud M. Nemat-Alla
Faculty of Engineering, Assiut University
nematala1@yahoo.com

Journal bearings are extensively used in most of rotating machinery. Of course high performance of journal bearings will increase the efficiency and life time of such machines in addition to decreasing the running cost.

An important parameter that may decrease friction loss in the journal bearing and increase its life is the journal materials. Porous and low friction materials may increase the efficiency of the journal. In order to have bearing materials with long life time in addition to increasing the performance of the journal bearings the principle of *functionally graded materials* (FGMs) will be adopted. FGM is a new class of composite material, consisting of two or more phases, which is fabricated with variable composition and/or microstructure in some spatial direction. Where, the gradation of the mechanical, physical and/or chemical properties can be controlled. Graphite as porous and low friction bearing material has good tribological behavior but it has low strength and low fracture toughness. While coppers as bearing material has high ductility, good strength and low tribological behavior. In order to obtain bearing material that has both advantages of graphite and copper functionally graded copper/graphite will be adopted. The centrifuging method or centrifugal casting will be adopted to obtain the gradient structure from graphite and copper.

Copper/graphite FGMs with different volume fractions will be manufactured and adopted through the current investigations. Then tribological behavior, composition optimization and microstructure of the adopted graphite/copper FGMs will be carried out in order to obtain the optimum composition.