"Tribological Investigation on B83 Babbit Reinforced with Silicon Carbide"

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ABSTRACT

B83 Babbit is the most popular material for fabrication of journal bearings by casting, hard facing, and metallization in Russian engineering. In addition to a low friction coefficient, this alloy has such attractive properties such as rapid conformability, good thermal conductivity, high impact viscosity, and compatibility with oil. However, low fatigue strength upon alternating loads and moderate wear resistance of Babbitt decrease the operating life of journal bearing. The introduction of ceramic particles into a matrix alloy can increase the load-bearing capacity and the wear resistance of composite materials. Metal matrix composites reinforced by nanoparticles are very promising materials, suitable for a large number of applications. The nanoparticles can improve the base material in terms of wear resistance, damping properties and mechanical strength. This study focuses on preparing B83 Babbitt metal matrix composites with SiC reinforcements for various compositions. The purpose of this research to study tribological properties and microstructure of composite material.

Keywords: Babbit metal, Tribological properties, pin on disc tribometer, journal bearing, microstructure.

I. INTRODUCTION

Metal matrix composites reinforced by nano-particles are very promising materials, suitable for a large number of applications. These composites consist of a metal matrix filled with nano-particles featuring physical and mechanical properties very different from those of the matrix. The nano-particles can improve the base material in terms of wear resistance, damping properties and mechanical strength. [5] Metallic matrix composites are combinations of two or more different metals, intermatallic compounds or second phases in which dispersed phases are embedded within the metallic matrix. They are produced by controlling the Morphologies of the constituents to achieve optimum combination of properties. Properties of the composites depend on the properties of the constituent phases, their relative amount, and dispersed phase geometry including particle size, shape and orientation in the matrix. [10]

The disadvantages of tin based babbits are their low wear resistance and fatigue strength because of the acute-angled shape of coarse SnSb intermetallics, the vertices and edges of which serve as stress concentrators, and their structural heterogeneity, which is related to the segregation processes that occur during solidification and cooling. The properties of babbits can be improved by modification with ceramic microparticles and nanoparticles, i.e., by the formation of precipitation-hardened composite materials (CMs) based on them. The introduction of ceramic particles into a matrix alloy can increase the load-bearing capacity and the wear resistance of composite materials. [1]

The Babbit metal widely used in centrifugal pump bearing. For this research work the KSB Boiler feed pump is taken as an application. The pump bearings support the hydraulic loads imposed on the impeller, the mass of impeller and shaft, and the loads due to the shaft coupling or belt drive. Pump bearings keep the shaft axial end movement and lateral deflection within acceptable limits for the impeller and shaft seal. The lateral deflection is most influenced by the shaft stiffness and bearing clearance.

II. OBJECTIVES

1. To synthesis silicon carbide nanoparticles reinforced B83 Babbitt metal matrix composite specimen using stir casting.
2. To study tribological properties of composite material for different combination of B83 Babbit and silicon carbide nanoparticles.
3. To select best composition of prepared composite material for boiler feed pump bearing.
4. Find the wear of Babbitt metal using Pin-on-Disc Tribometer for varying operating load and speed.