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Tribological properties of Tin-based Babbitt bearing alloy with polyurethane coating under dry and starved lubrication conditions

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Abstract: To improve the tribological properties of Babbitt alloy used as journal bearing pad specifically under severe condition, Babbitt substrate was sprayed with a coating of polyurethane (PU) polymer which had been suitably modified with PTFE particles. Tribological performances, under dry and starved lubrication conditions, of the Babbitt alloy substrate (i) sprayed with PU composite coating and (ii) with bare surface were investigated. Results showed that Babbitt substrate sprayed with PU composite coating gave better friction reduction and wear resistance than the counterparts of bare Babbitt. This was because the PU composites coating served as protective layer leading to the formation of PTFE transfer film on mating surface, hence improving the associated tribological properties during sliding.

Keywords: Polyurethane; PTFE particle; Tribological properties; Babbitt alloy

1. Introduction

Journal bearings have many advantageous behaviors, typically like: being able to operate with high precision, being capable of withstanding large impact load, and having long service life, etc.. Hence, they are often employed in high speed rotary machinery under heavy loading conditions, especially are used as bearings for large hydroelectricity generation [1, 2] and for circulating pump in nuclear power plant [3]. The characteristics of high thermal conductivity, good embedability and flexible conformability of Babbitt alloys [4-6] have been well recognized and subsequently utilized as bearing pads and/or bearing sleeves in many types of bearing components. Even in a well-designed high speed rotating shaft system, oil film is likely to fail when bearing is (i) operating under periodically varying stress and (ii) in the processes or stages of on-off swapping condition(s) [7]. Under such circumstance, the direct contact and rubbing between the Babbitt bearing pad and the rotating shaft usually generates huge amount of

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