Sliding Wear Experiments on Clad Gold-Nickel Material Systems Lubricated with a 6-Ring Polyphenyl Ether

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Abstract

This paper presents sliding wear data collected on a clad 96% gold 4% nickel and a clad 90% gold 10% nickel material systems, with and without a flash gold outer layer. These material systems are under evaluation for unlubricated and lubricated sliding wear durability. The lubricant used during this research project was a 6-ring polyphenyl ether. These material systems were lubricated by dipping them in a 2% to 3% solution by volume of the 6 ring polyphenyl ether (OS 138) mixed with proplyene glycol monomethyl ether. A connector pin and a bent strip of metal that had been clad with the gold-nickel material system was mated to form the pseudo-crossed rod configuration used in this research project. The metal strip was formed with a small radius of curvature, hemi-cylindrical, bend to produce a linear contact surface perpendicular to the pin. This pseudo-crossed rod configuration was used to approximate a pin/socket type contact.

Sliding wear experiments were conducted to 150 grams normal force. The amplitude of the motion was 2.5 mm with a velocity of 2.5 mm/second. Sliding wear experiments were conducted until either the dynamic coefficient of friction exceeded 0.4 or until reaching 1000 sliding wear cycles. At least five experiments were conducted at each experimental condition.

Three different series of experiments were conducted during this sliding wear research project. These series included unlubricated, lubricated and partially lubricated experiments. During the unlubricated series of experiments, all of the material systems failed to meet the test requirements in less than 50 sliding wear cycles on the average. All of the lubricated material systems endured 1000 sliding wear cycles and never exceeded a dynamic coefficient of friction of 0.4. During the partially lubricated series, sliding wear experiments were conducted using an unlubricated pin and a lubricated metal strip, and using a lubricated pin and an unlubricated metal strip. The lubricated pin and unlubricated metal strip endured more sliding wear cycles than the unlubricated pin

and lubricated metal strip. Therefore, if only half of a mating system will be lubricated then the pin should be selected for lubrication.

Key words: Sliding wear, Gold, Clad, lubrication