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Stainless Steel Swarfs for Replacement of Copper in Non-Asbestos Organic Brake-Pads

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Abstract : Nowadays extensive research is going on in the field of friction materials (FMs) for development of eco-friendly brake-materials by removing copper as it is a proven threat to the aquatic organisms. Researchers are keen to find the solution for copper-free FMs by using different metals or without metals. Steel wool is used as a reinforcement in non-asbestos organic (NAO) FMs mainly for increasing thermal conductivity, and it affects wear adversely, most of the times and also adds friction fluctuations. Copper and brass used to be the preferred choices because of superior performance in almost every aspect except cost. Since these are being phased out because of a proven threat to the aquatic life. Keeping this in view, a series of realistic multi-ingredient FMs containing stainless steel (SS) swarfs as a theme ingredient in increasing amount (0, 5, 10 and 15 wt. %- S_5, S_{10}, and S_{15}) were developed in the form of brake-pads. One more composite containing copper instead of SS swarfs (C_{10}) was developed. These composites were characterized for physical, mechanical, chemical and tribological performance. Composites were tribo-evaluated on a chase machine with various test loops as per SAE J661 standards. Various performance parameters such as normal μ, hot μ, performance μ, fade μ, recovery μ, % fade, % recovery, wear resistance, etc. were used to evaluate the role of amount of SS swarfs in FMs. It was concluded that SS swarfs proved successful in Cu replacement almost in all respects except wear resistance. With increase in amount of SS swarfs, most of the properties improved. Worn surface analysis and wear mechanism were studied using SEM and EDAX techniques.

Keywords : Chase type friction tester, copper-free, non-asbestos organic (NAO) friction materials, stainless steel swarfs
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