

Study on wear properties of aluminium-silicon piston alloy

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Abstract: Low expansion aluminium-silicon eutectic alloys are cast to produce most of the automotive pistons. The structure and properties of these alloys are very much dependent on the cooling rate, composition, modification and heat treatment operations. In this study, locally available automotive 'scrap pistons' were used as basic raw materials and a natural gas fired crucible furnace was used for melting purpose. The wear behaviour of both as-cast and heat treated specimens were studied under dry sliding conditions at room temperature using a pin-on-disc type wear testing apparatus. The extent of wear damage and the type of wear were investigated by means of weight loss measurement and optical microscopy techniques. The full heat treatment showed a great influence on the wear properties of the aluminium-silicon piston alloy as it reduced the wear rate of the specimens. The exceptional high tensile strength and hardness were attributed to the heat treatment condition with decrease in ductility. Significant changes in structure were also observed to occur specially in the primary and eutectic silicon phases. Some of the results of this study can be recommended for tribological use of this alloy in manufacturing automobile spare parts. 2001 © Published by Elsevier Science B.V.