

Investigation of Mechanical and Wear Properties of Al-Mg₂Si-Cu-Ni Cast Composites In As-Cast And Heat Treated Conditions

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ABSTRACT

This study aims to examine the mechanical and wear properties of aluminum alloy (Al-Mg₂Si-Cu-Ni) in as cast and heat-treated conditions. Sliding tribology tests were carried out via a Pin-on-disc set up. Tensile, compression and hardness experiments on as-cast and 1 hour homogenized specimens were done to evaluate the mechanical properties. Universal testing machine and Brinell hardness tester were used to conduct the tensile-compressive and hardness tests at room temperature, respectively. The microstructure evolution was analyzed by X-ray diffractometer and also scanning electron microscope. The results of wear and mechanical properties indicated that heat-treated Al-Mg₂Si-Cu-Ni cast composites had superior tensile and compressive strength, wear resistance and hardness, as compared to as cast samples. X-ray diffraction analyzes proved the formation of some precipitated phases such as Al₂Cu, Mg₂Si, Al₃Ni, Al₈Si₆Mg₃Fe and Al₄Cu₂Mg₈Si₇. The fracture surfaces of as-cast samples were like low cycle fatigue and showed only micro voids and precipitates, while for heat treated samples were more like high cycle fatigue revealing crack initiation at the surface.

Keywords: Al-based cast composites, tensile strength, heat treatment, wear rate.

RETRACTION NOTE: The Editors have retracted this Article at the request of the authors.

We apologize for any inconvenience this may have caused.