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## Experimental investigation of Al7075 reinforced with WC and SiC metal matrix composites

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## ABSTRACT

This study proposed the methodology to produce silicon carbide particulate MMCs based on aluminum to create typical low-cost MMCs and achieve a homogeneous scattering of ceramic material. The trial was done with a different weight fraction of Silicon Carbide (2%, 3%) and Tungsten Carbide (2%, 3%) with all other parameters being maintained. A growing hardness was noticed with the rise in SiC & WC weight 2 to 3%. The advantages of this technique include improved mechanical characteristics, minimal residual stress and deformation, and fewer flaws. Although casting technique poses numerous technical obstacles, this problem can nevertheless be addressed. Aluminum materials with high strength to weight and low density have been proven to be the best option. As lightweight materials are developed, weight reduction has been offered several alternatives through conducting different tests to analyze different features such as mechanical and metallurgical characteristics.

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## 1. Introduction

A composite material is formed by a close combination of at least two chemically and physically distinct materials, which should remain separate and distinct while maintaining a good and continuous interface between them. The reinforcing components in the whole volume of the matrix should be as uniform as possible [1–2]. Composite materials for metal matrix have been used for some time in several sectors of everyday life. This composite range includes other elements such as graphite cast iron or high carbide steel and carbides made of carbides and metal binders [3–4].

Composites of metal matrix become attractive for usage as building and functional materials when the proprietary profile of conventional materials either fails to meet the increasing standards of particular requirements or the problem's solution. The Metal Matrix Composite is designed to produce customized characteristics by combining metal (Matrix) with hard particle/ceramic (Reinforcement) [5–6].

Aluminum matrix composites, like any composite, are not one material but a family of materials that may be adjusted for rigidity, strength, density, heat, and electricity characteristics [7]. In order to accomplish necessary functions, you can change the matrix alloy, the strengthening material, the volume and form of the reinforcement, the position of the reinforcement, and the production process [8]. The literary evaluation found that the main difficulty was that ceramic particles would be uniformly dispersed through low-cost conventional equipment for commercial use [9–10]. In the current study, there has been a small attempt to examine the dispersion of WC & SiC particles with Al matrix produced by various methods, e.g.

- (a) Unless the process of stirring
- (b) Unless processed manually
- (c) Two stages of stir casting.

An effort was made to link the hardness to impact strength to the weight of WC & SiC in particulate strengthened MMCs created using a two-step stir casting technique mixing method [11].

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