



Production of aluminium matrix TiCp composite by modified stir casting process

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Abstract

Composite plays a vital role in material science, especially in the field of aerospace, marine, transportation, military and structural applications. Metal Matrix Composite (MMC) focuses mainly on a relatively high temperature and wear resistance applications. Among MMCs, Aluminium Matrix Composite (AMC) reinforced with TiC has better potential for high temperature applications. It is a great challenge to produce and fabricate AMC in an economical way. Production of AMC has been done in different methods. An attempt was made to produce AMC with TiC particulate reinforced composite using modified stir casting process. Composite is successfully produced at five different weight % of TiC particle addition without defects. The weight fractions used were 3%, 4%, 5%, 6% and 7%. Colour optical micrographs, XRD, and EDX analysis revealed the presence of TiC in the cast aluminium matrix. Tensile test result shows clear indication of considerable increase in Ultimate Tensile Strength (UTS), when % TiC addition was increased. Calculated specific strength of the composite increased with the addition of higher percentage of TiC.

Key words: MMC, Specific strength, XRD, Tensile testing, Modified stir casting process

1. Introduction

Modern structural concept demands reductions in both weight as well as cost of production and fabrication of materials. Monolithic metals and their alloys may not always meet the demands of today's advanced technologies. MMC basically consist of a metallic matrix

combined with a ceramics (oxides, carbides etc.) or metallic (lead, tungsten, molybdenum etc.) dispersed phase in matrix. Composite mechanical property of composite is a function of volume fraction, size, shape, and, spatial distribution of the reinforcement. It also depends on how well the externally applied load is transferred to the reinforcing phase. Stronger adhesion at the particle / matrix interface improves load transfer, increasing yield strength