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MECHANICAL PROPERTIES IMPROVEMENT OF METAL MATRIX COMPOSITES (MMC) BY VIBRATION MOULD CASTING PROCESS

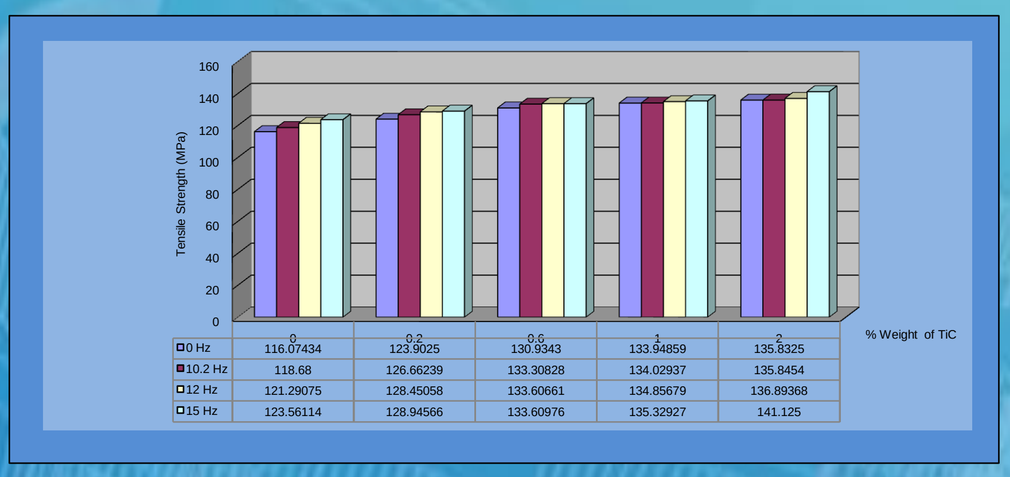
INTRODUCTION / NOVELTY

The development of new materials such as composite castings becomes important in the advancement of engineering materials. Therefore, the effects of subjecting solidifying particulate reinforced aluminium alloy matrix composite to various sources of vibration on the resulting casting quality was investigated. A mechanical vibration technique for inducing vibration resulting in enhanced mechanical properties, such as tensile, hardness, density, impact properties and microstructure was devised. For experimental, TiC particulate reinforced aluminium LM6 alloy matrix composites are fabricated by different particulate weight fraction and microstructure studies were conducted. It is found that vibration mould during the process contributes the quality of castings. The results show that the mechanical properties of castings have been improved compared with conventional casting processes.

METHODOLOGY

USEFULNESS / ADVANTAGES

1. Low shrinkage porosities
2. Promoting grain refinement
3. Increased density
4. Degassing
5. Size and distribution of the second phase
6. Improved mechanical properties and homogeneity



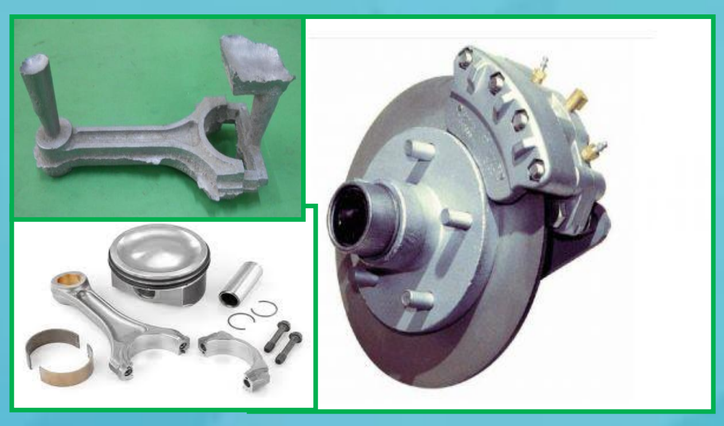
	0	0.2	0.6	1	2
0 Hz	116.07434	123.9025	130.9343	133.94859	135.8325
10.2 Hz	118.68	126.66239	133.30828	134.02937	135.8454
12 Hz	121.29075	128.45058	133.60661	134.85679	136.89368
15 Hz	123.56114	128.94566	133.60976	135.32927	141.125

Average of tensile strength vs wt.% of TiC

Summary
The tensile strength and Young's modulus of elasticity were increased gradually as the TiC content in the composite increased from 0.2, 0.6, 1 and 2% by percentage weight fraction. The tensile behavior of the processed composites had strong dependence on the weight fraction addition of the second phase reinforcement particulate on the alloy matrix and various vibration frequencies during solidification processing.

MARKET POTENTIAL

- All of casting industries
- MMC applications/industries



Conventional Casting

Vibration Mould Casting

Project Leader : Dr. M. Sayuti, ST.,M.Sc

Department of Industrial Engineering,
Faculty of Engineering
Malikussaleh University, Aceh, 24351
Indonesia

Project Leader Expertise :
Processing of Composite Material, such as Metal Matrix Composite and Polymer Matrix Composite, Non-Destructive Evaluation Techniques of Metals and Composites, Design and Manufacturing with Composite Materials, CAD/CAM, Casting Process and Manufacturing System Engineering.

H/P. +6282168906872