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# Al7075 Alloy Based Metal Matrix Composite Materials

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**Abstract:** *In recent years there is a lot of research work has been carrying out on Alluminium alloy and its metal matrix composites. Since a Aluminium alloys are applied in the areas of Aerospace, Automobile, Defence, marine and Structural applications. Aluminium alloy based metal matrix composites has given enhanced favourable properties when combine with different weight percentage and sizes of reinforcements in Matrix materilas .it has given good results of Physical, Mechanical, Morphological and Tribological properties. It also has Good corrosion , Wear resistance and Excellent machinability properties also*

**Keywords:** Aluminium alloy, Al7075, Fbrication techniques.

## I. INTRODUCTION

Industries now a days searching for the materials with excellent material properties than a parent materials, which leads in advancement in reduction of weight with increase of strength in the aerospace, automobile applications for fuel effiect and durability of structural components. A review of Aluminium Al7075 metal Matrix composites with different reinforced particles with varying weight percentsges and sizes are fabricated by different casting process. the Prepared materials samples were examined to find out properties like physical strength ,Mechanical strength, Morphological study and Tribological properties results evaluated and results are studied and discussed here.

## II. LITERATURE REVIEW

**Manjunatha et al [1]** Investigated the microstructure and mechanical behaviour of Boran carbide particles reinforced to Aluminium Al7075 alloy with varying weight% of 3% & 6% of nano sized paricles. The Composite was fabricated by Liquid stir casting method. Microstrucure of Prepared composite was examined by SEM, it was found that their is uniform distribution of Boran carbide particles in the matrix. The Test results of Hardness, UTS, Yield strength and compression strength has been increased with increase in Wt% of nano boran carbide particles. and % of elongation of composite decresed with increase in boran carbide particles in composite.

**Mehmet Emin Demir et al [2]** studied the Aluminium alloy prepared with squeeze casting method by adding $B_4C$ particles in Aluminium alloy produced by adding in the ratios 4%,8%,10%,12% reinforced ratio's. The prepared composites are examined physical, mechanical and Tribological properties. It was found that at 12% reinforcement ratio has found the highest hardness, at 10% showed highest Tensile strength anf Flexural strength. The effect of aging period was examined and found considerable improvement in strength on certain aging period and partially decreased after certain aging period.

**R. Malkiya Rasalin Prince et al [3]** studied the AL7075-$Tib_2$-$B_4C$ hybrid composite fabrication and its varying weigth% of reinforcement in 2%,4%,6%,8% of TiB2& 4% $B_4C$.The facbricated composite has showned the uniform distribution of reinforcent of particles has been observed by SEM microstructure observation. The hardness, Tensile strength and compression strength of Al7075-TiB2-
B4C composite were improved by Wt% 17.5%,15.2% & 10.8% when compared to as cast Al.A dry sliding wear test was conducted at room temperature by Pin on disc method.The wear resistance of TiB2-B4C composites at Wt% of 17% was highly improved and worn surface damage was reduced by analysing by SEM analysis.

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**T.S Manjunat et al [4]** Studied the Al reinfored with SiC and Gr Prepared by powder metallurgy method. The composite prepared with Al7075 matrix with particles size of 24 and 50 Um by varying SiC wt% of 6 to 18% with constant Gr particles. The mechanical properties Density, Hardness, Tensile & compression strength was examined with ASTM standard specimen's. The results were statistically analysed using Anova method at 5% siginificance level. The results of density and mechanical properties increases with smaller particle size matrix & increased with wt% of SiC particles.

**Mohit Kumar Sahu et al [5]** studied the hybrid aluminium matrix composite of Aluminium Al7075 with B4C & Fly ash were reinforced with stir casting method. The different Wt% of ratios in 2:2,2:4,2:6,2:8,2:10 with 2Wt % of Fly ash was kept constant with varying Wt% of 2,4,6,8,10% of B4C was examined. Among all ratios it was found 2:8% was the best combination given best result. Mechanical properties considered for cold Up setting process. which was one of the types of forming process used in automotive applications.

**Siddesh Matti et al [6]** evaluated the fabricated Al7075 alloy with constant 1 Wt% of red mud particle with varying wt% of mica of 2,4,6 & Fly ash with 1,3,5 wt% by stir casting method.The study of microstructure by SEM & XRD pattern confirmed evenly particle distribution. The superior wear resistance at Wt% 6 of mica,Fly ash with Wt% of 5 & red mud of 1% showed less coefficient of friction as compared to other hybrid composites.As mica & Fly ash content increased Al7075 alloy showed decreased wear rate.

**S. Rajesh et al [7]** studied the behaviour of Al7075 alloy with fly ash and Silicon Carbide (SiC) blended composite materials manufacured by using stir cast technique. It studied with fly ash and Silicon mass fraction varied around 0 to 10 Wt%. The casted composite material has a higher ultimate and yield strength at 90% of Al7075 with 7.5% SiC & 2.5% fly ash. The impact of UTS & yield strength on the Wt% of fly ash was slightly lower than SiC. The hardness was found higher with 90% of Al7075 alloy with 5% SiC & 5% fly ash.

**S Devaganesh et al [8]** studied the fabricated Al7075 MMC with 90% Wt and SiC 5% of Wt particles reinforced composites and various other lubricants graphite, hexagonal boron nitride and molybdneum disulfide with 5% Wt.It was found that Al7075 with 5% Wt SiC & 5% Wt of graphite composite was performed excellent Mechanical i.e Tensile strength,compression strength and hardness and Tribological properties i.e wear properties through pin on disc method.

**N Ramadoss et al [9]** studied the synthesis $B_4C$ & BN reinforced Al7075 hybrid composites by stir casting method with varying wt% Like 3%,6% & 9% of $B_4C$ and keeping 3% of BN constant for marine applications.The morphology of hybrid composites was studied by XRD method found homogeneous particle distributions of particles observed.The hardness of composite has found with increase wt% of reinforcement.when compare with base matrix.The mechanical strength i.e Tensile & compression strength has been increased by 22% in hybrid composite when compare to base matrix. The corrossion rate decreased by 18.5% between 3% & 6% $B_4C$ addition and decreased by 22.4% b/w 6% and 9% $B_4C$ addition.

**R Manikandan et al[10]** studied the composites of Al7075 with Boran carbide and Cow dung ash (CDA) reinforced with varying Wt% from 0 to 10% using two stage stir casting technique. The microstructure was investigated by optical microscope, SEM with EDX & XRD method. The microstructure images confirmed that there was uniform distribution of reinforcement particles in matrix The mechanical properties i.e tensile strength was observed incresed with adding B4C &CDA particles. Impact strength slightly reduced with adding B4C &CDA particles. Tribological increased with adding B4C -CDA particles.

**Shoufalin et al [11]** studied Al7075 aluminium alloy with reinforced of B4C and MoS2 as a lubricant with Wt% of 4%,8% & 12% by stir casting process.The casted composites was analysed with variuos tests.The reinforecemnt of particles was found uniform distribution in the matrix.The tensile strength ,compression strength and hardness was increased by adding reinforcemnt when compare to base matrix.The significant improvemnt of wear resistance had found by including solid lubricant ($MoS_2$) .

**Uppada Rama Kanth.et al [12]** investigated that composites reinforced with fly ash & Sic with different wt% varying from 0 to 10 wt % with 53 Um were prepared.This composite was studied the optical microscope by SEM analysis it was found that there was uniform distribution of fly ash and SiC particles throught the matrix.The UTS,yield strength were improved by addition of SiC particles and hardness was increased by adition of fly ash particles.

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**N.Romdoss et al [13]** investigated the B4C and BN reinforced Al 7075 Hybrid composite was fabricated by stir casting process with varying different wt% 3,6,9 of B4C and keeping 3% of BN constsnt for marine applications.The study of optical microscope shown that there was equally distribution of reinforcement particles throughout the matrix.Vickers hardness was increased with increase in reinforcent when compared to base matrix alloy.The mechanical strength was incresed 22% by addition of B4C & BN to base matrix.The corrossion rate decreased by 18.5% b/w 3% & 6% B4C addition and decreased by 22.4% b/w 6% & 9% BC addition.

**P.Bharathi et al [14]** studied Composite of Al7075 reinforced with different wt% 2% to 6% of SiC with 2 wt% of B4C were fabricated using powder metallurgy techniques.It showed that there was uniform distribution of SiC abd B4C particles throughout the matrix observed by micrstructural study of FESEM.The Higher hardness was oberved for 6%wt of SiC.The Higher compression strength obtaiained for 3% wt of SiC.The wear rate of 4%wt of Si smaller.The higher corrosion resistance at 2% wt og SiC observed.

**T Raja et al [15]** studied the composites fabricated by Al7075 aluminium alloy reinforced with B4C & MoS2 under various wt% of 1.5%,3%,4.5% with MWCN as a constant wt% of 0.2% using stir casting process.It has been observed that reinforcement particles were uniformly distributed under microscopic investigation.The tensile strength and hardness of composite has increased by adition of reinforcement around 4% and 81% increased.Significant improvement of wear resistance and Coefficient of frictionis reduced to maximum around 63% achieved by adddition of solid lubricant($MoS_2$) and $B_4C$.

## III. CONCLUSION

From literature review of composites of Aluminium alloy Al7075 with various reinforcent particles was showned better reinforcent of particles was observed by SEM,Optical microscope studies.Hardness was incresed with addition of reinforcent.The Mechanical strength was improved with increased wt% of reinforced particles. Good Corrsion resistance and improved with Tribologiacal studies

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