Metal Matrix Composition

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Abstract - *Aluminum - alumina composite have widely increasing usage due to its merit of processing, high specific strength and modulus of elasticity and with good deformability and conductivity. Metal matrix composite are the composition with different isotropic property with substantial improvements in strength and stiffness which provides the unenforced material. Now a day's technology aims at high physical and mechanical property. Aluminum is examined by micro-structure analysis hardness distribution and tested for its mechanical property such AS tensile strength and hardness. Reviews literature that the particle reinforced MMCs exhibit region able increase in physical property.*

Key Words: **Tensile Strength, Hardness, High specific strength, Conductivity.**

INTRODUCTION

Aluminium is important metal for industries but it was first utilized for manufacturing of household and ornamental items before becoming important material for machine component and large industries. Aluminium alloys and its composite is most application used and superior performance as compared to another rival metals. Important properties which make different and most applicable aluminium alloy is light weight. Light weight has many important considerable factor in engineering applications. In the automotive industry it mean low fuel consumption (which means increasing efficiency), low emissions, less weight and easier handling. A composite is a mixture of two or more constituents which are chemically different on a microscopic scale can be called as composites, properties of composites is totally different as compare to constituents. In most cases the reinforcement is harder, stronger and stiffer than the composites with some exceptions. Boron/aluminium composites provide good mechanical properties up to temperature 510 degree whereas equivalent to boron/ epoxy composites is limited up to 190 degree only.Aluminum compounds are broadly utilized in the car business as a result of their high solidarity to weight proportion just as high thermal conductivity. It is utilized especially in car motors as chamber liners just as other pivoting and responding parts, for example, the cylinder, drive shafts, brake rotors and in other applications in car and aviation business.

There is a difference between metal matrix composites and multi-phase metallic alloys as the concept of MMCs introduces additional degrees of freedom into designing the micro structure. Materials with desirable properties cannot obtained by conventional alloying. The reinforcing constituent may be a particle, short fiber or continuous fiber and may range in a millimeter in size. By changing the shape, size, orientation content and reinforcement type. Metal matrix composite can be classified in to many ways but generally it classified in to method of their reinforcement, type and also shape. Mainly method of production of Aluminium Metal Matrix Composites are classified in two groups:-

1) Liquid state process

2) Solid state process

→ AL6061

Our metal is Al6061 is strengthened are utilized to fly debris altogether improves extreme elasticity alongside compressive quality and hardness properties as contrast and unreinforced framework. Al6061, initially known as "Alloy61s" was one of the first to be created in 1935 and is one of the most regularly accessible warmth me triable aluminum composites for business use. The Al6061 combinations is essentially made out of Al, Mg, and Si. Its property incorporates basic quality and strength, great surface completion, great consumption protection from environment what's more, ocean of water, machinability and capacity to be effectively welded and joined.AL6061 is generally utilized in flying machine, car segments and the constructional materials. Al 6061 has most extreme rigidity close to 150 MPa, and greatest yield quality close to 83 MPa or 110 MPa.

Fly debris strengthened Aluminum combination (Al6061) composites, handled by mix throwing course was utilized in this work. The three sorts of mix cast composites had a support molecule size of 4-25, 45-50 and 75-100 µm each. The required amounts of fly debris (10, 15 and 20 Wt. %) were taken in powder compartments. At that point the fly debris was warmed to 450°C and kept up at that temperature for around 20 min. at that point gauged amount of Al (6061) amalgam was softened in a

pot at 800 degree which is more than 100°C above liquidus temperature of the lattice amalgam. The liquid metal was blended to make a vortex and the gauged amount of preheated fly debris particles were gradually added to the liquid compound.

CHEMICAL COMPOSITION OF AL6061

Mg	0.95
Si	0.75
Fe	0.22
Cu	0.22
Ti	0.09
Cr	0.10
Zn	0.05
Mn	0.04
Al	Bal

CHEMICAL COMPOSITION (WEIGHT PERCENTAGE)

Al_2O_3	28.22
SiO_2	59.96
FeO_3	8.85
TiO_2	2.750
Loss of ignition	1.43

APPLICATION

- ➔ It is widely used as a construction material.
- ➔ Construction of bicycle frame camera lens etc.

➔Al7075

Aluminum compounds fall into two general classes: heat-treatable and non-heat treatable. Arrangement 7xxx amalgams are viewed as the high-quality flying machine combination family, are heat treatable by arrangement and maturing. Al amalgam 7075 was presented in 1943 by Alcoa and is principally a flying machine and aviation compound. 7075 is ordinarily utilized in applications requiring a mix of high quality and moderate durability and consumption obstruction, including flying machine structures, apparatuses and shafts, rocket parts and different protection gear.

The combination ingots are set in the cauldron, and afterward the pot is warmed to the necessary temperature. The warming of the pot might be finished by methods for electric heater, coal heater and so forth. The temperature inside the heater was recorded utilizing a temperature recorded. The cauldron was taken out when the temperature was 660°C. Here we have utilized an enlistment heater. Degasified is added to molten metal to expel dissolvable gases present in fluid state metal, in the measure of 2 to 3 percent of liquid metal weight.

Liquid metal at around 6600°C is taken in a cauldron from the heater. The temperature is recorded utilizing a thermocouple. At that point the fortifications in particular e-glass, and fly debris are added to the liquid metal and with the assistance of a mechanical stirrer the fortifications are effectively blended in with the grid. At that point following couple of moments of blending, the fluid metal with fortifications are filled the bites the dust to get the required castings.

CHEMICAL COMPOSITION OF ALLOY 7075 (CONCENTRAION %)

Cr	0.18-0.28
Cu	1.2-2.0
Mg	2.1-2.0
Mn	0.30
Si	0.40
Ti	0.20
Zn	5.1-6.1
Fe	0.5
Al	Balance

APPLICATION

- ➔ It is widely used in automotive, aircraft, aerospace industries.
- ➔ Highly stressed part such as gear, fuse part, etc.

CONCLUSIONS

Aluminium metal matrix composites (ALMMC) has great future in application for design engineer. ALMMCs enhanced the properties for high temperature and also improved wearing / corrosion. This alloys provide new research and development for further improvement in of ALMMCs. Both Al6061 and Al7075 enhanced their properties in every manner (yield strength, thermal conductivity, melting point etc.).

Material properties	**Type 6061 Aluminum alloy**		**Type 7075 Aluminum alloy**	
Units	**Metric**	**English**	**Metric**	**English**
Yield strength	276 MPa	40000 psi	503 MPa	73000 psi
Modulus of Elasticity	68.9 GPa	10000 ksi	71.7 GPa	10400 ksi

Thermal conductivity	167 W/m-K	1160 BTU-in/hr-ft^2-°F	130 W/m-K	900 BTU-in/hr-ft^2-°F
Melting point	582 - 652°C	1080 - 1205°F	477 - 635°C	890 - 1175°F
Electrical resistivity	3.99 x 10^{-6} ohm-cm		5.15 x10^{-6} ohm-cm	
Hardness (Brinell)	95		150	
Machinability	Good		Fair	

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