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Fabrication and design of specimen for Mechanical Properties of Aluminium Alloy Reinforced with SIC and Fly Ash using ANSYS

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ABSTRACT:

This work deals with fabricating or producing aluminium based metal matrix composite and then studying its microstructure and mechanical properties such as tensile strength, impact strength and wear behavior of produced test specimen. In the present study a modest attempt has been made to develop aluminium based MMCs with reinforcing material, with an objective to develop a conventional low cast method of producing MMCs and to obtain homogeneous dispersion of reinforced material. To achieve this objective stir casting technique has been adopted. Aluminium Alloy (LM6) and SiC, Fly Ash has been chosen as matrix and reinforcing material respectively. Experiment has been conducted by varying weight fraction of Fly Ash (5% and 15%) while keeping SiC constant(5%). The result shown that the increase in addition of Fly Ash increases the Tensile Strength, Impact Strength, Wear Resistance of the specimen and decreases the percentage of Elongation.

1. INTRODUCTION:

Composite material is defined as the material which has two or more distinct phases like matrix phase and reinforcing phase and having bulk properties significantly different from those of any of the constituents present in the matrix material. Many of common materials also have a small amount of dispersed phases in their structures, however they are not considered as composite materials since their properties are similar to those of their base constituents.

Favorable properties of composites materials are high stiffness and high tensile strength, low density, high temperature stability, and also in some of the applications electrical and thermal conductivity properties are also taken into consideration, the properties like coefficient of thermal expansion, corrosion resistance should be low with improved wear resistance. By keeping all these parameters in mind the metal matrix composites are being produced. Improved mechanical properties can be incorporated in Metal Matrix Composites very easily. That is the reason why these MMC materials are getting more attention in recent years .Before preparing the aluminum metal matrix composite material I have studied some papers in which the addition of Fly ash and SiChas been made and mechanical properties were studied.

1.1 Definition of Composite Material:

The composite material can be defined as the system of material consisting of a mixture of combination of two or more micro constituents insoluble in each other and differing in form and or in material composition .These materials can be prepared by putting two or more dissimilar material in such way that they function mechanically as a single unit. The properties of such materials differ from those of their constituents. These materials may have a hard phase embedded in a soft phase or vice versa. Normally in the composite material have a hard phase in the soft ductile matrix where the hard phase act as a reinforcing agent increase the strength and modulus, and soft phase act as matrix material.

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The requirement for satisfying the above mentioned condition is (a) The composite material has to be man-made (b).The composite material must be a combination of at least two chemically distinct materials with an interface separating the components. (c) The properties of composite should be isotropic.

1.2 Classification of Composites On the basis of Matrix composite can be classified in the following groups

a) Polymer-matrix composites (PMC)

The most common matrix materials for composites are polymeric. Polyester and vinyl esters are the most widely used and least expensive polymer resins. These matrix materials are basically used for fiber glass reinforced composites. For mutations of a large number resin provide a wide range of properties for these materials .The epoxies are more expensive and in addition to wide range of ranging commercials applications ,also find use in PMCs for aerospace applications. The main disadvantages of PMCs are their low maximum working temperature high coefficients of thermal expansion and hence dimensional instability and sensitivity to radiation and moisture. The strength and stuffiness are low compared with metals and ceramics.

1.4 Strengthening mechanism of composite Strengthening mechanism of fiber reinforced composite Rule-Of-Mixture

Most studies concerned with the evaluation of mechanical behavior of fiber reinforced composites use what is called a "Rule-Of-Mixtures"(ROM) to predict and/or to compare the strength properties of the composite The ROM is nothing but an operational tool that uses weighted volume average of the component properties in isolation to obtain the magnitude of the property for the composite. Specifically, in the case of composite containing uni axially aligned, continuous fibers, the composite stress is written as

$$\sigma_c = \sigma_f V_f + \sigma_m V_m \qquad (1)$$

Where **σ** is the axial stress, **V** is the volume fraction of the component and the subscripts c, f and m refer to the composite, fiber and matrix, respectively. It is to be noted that

$$V_f + V_m = 1$$

Under conditions of isocratic, i.e, the longitudinal strain in the components being equal, one may write another ROM relationship for the elastic module,

$$E_c = E_f v_f + E_m V_m \qquad (2)$$

Where E is the elastic modulus and the subscripts represent the components as before. Eq. (2) neglects any transverse strain arising because of the different contractile tendencies of the components (i.e, $v_f = v$, where v is Poisson's ratio). However, for metallic systems, the difference in Poisson's ratio of the two components is generally insignificant and the ROM values are generally found to be within the limits of the experimental error. Another example of a property for which ROM works very well is the density **ρ.** One can write as

$$\rho_c = \rho_f v_f + \rho_m v_m \qquad (3)$$

It would appear from these studies that the ROM as applied conventionally to the strength properties of composites with metallic matrices is not valid. The whole is more than the sum of individual components in isolation

1.12 Fabrication techniques for metal matrix composites:

A number of composite fabrication techniques have been developed that can be placed into four broad categories. These are: (i) powder metallurgical techniques, (ii) liquid metallurgy. The liquid metallurgy techniques include unidirectional solidifications to produce directionally aligned MMCs, suspension of reinforcement in melts followed by solidification, compo casting, squeeze casting, spray casting, and pressure infiltration.

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The liquid metallurgy techniques are the least expensive of all, and the multi-step diffusion bonding techniques may be the most expensive.

1.13 Powder metallurgical techniques:

Powder blending followed by consolidation (PM processing), diffusion bonding and vapor deposition techniques come under solid state processing Powder metallurgy techniques offer the following three advantages over liquid metallurgy techniques for fabricating MMCs. (a) Lower temperatures can be used during preparation of a PM-based composite compared with preparation of a liquid metallurgy-based composite. The result is lesser interaction between the matrix and the reinforcement when using the' PM technique. By minimizing undesirable inter-facial reactions, improved mechanical properties are obtained. (b) In some cases, PM techniques will permit the preparation of composites that cannot be prepared by the liquid metallurgy. For instance, fibers or particles of silicon carbide will dissolve in melts of several metals like titanium, and such composites will be difficult to prepare using liquid metallurgy techniques. (c) However, PM techniques remain expensive compared to liquid metallurgy techniques for the composites like AI-SiC particle composites. In addition, only small and simple shape can be produced by PM techniques.

1.14 Powder blending and consolidation:

Blending of metallic powder and ceramic fibers or particulate has the advantage of close control over the ceramic content. Blending can be carried out dry or in liquid suspension. Blending is usually followed by cold compaction, canning, degassing and high temperature consolidation stage such as hot isocratic pressing (HIP) or extrusion. PM processed AMCs, contain oxide particles in the form of plate-like particles of few tens of nm thick and in volume fractions ranging from 0-05 to 0-5 vol % depending on powder history and processing conditions.

These fine oxide particles tends to act as a dispersion-strengthening agent and often has strong influence on the matrix properties particularly during heat treatment

3.4 Mechanical properties observation:

3.5 Hardness:

Bulk hardness measurements were carried out on the base metal and composite samples by using standard Brinnel hardness test. Brinnel hardness measurements were carried out in order to investigate the influence of particulate weight fraction on the matrix hardness. Load applied was 100 kgs and indenter was a steel ball of 1/16 inch diameter.

3.6 Tensile test:

The tensile testing of the composite was done, on Hounsfield Extensometer testing machine. The sample rate was 9.103pts/sec and cross-head speed 5.0 mm/min. Standard specimens with 30mm gage length were used to evaluate ultimate tensile strength. The comparison of the properties of the composite material was made with the commercially Aluminum alloy the sample dimensions as per ASTM A-370

3.7 Preparation of molding process:

Preparation of molding sand is a key process, determining the final quality of casting products. Special requirements are imposed at stabilizing and optimizing the parameters of the molding sand so that it should maintain its properties required for molding. These requirements can be satisfied as long as specialized mixing systems are used to prepare and control the sand mixing processes. The key elements of the system include sand mixers supported by dedicated measuring equipment operating in accordance with the approved control methods. Methods employed to determine the key properties of sand mix include the methods applied in on-line mixing control systems. The author's research to date has led to the development of a method whereby the sand quality indicator is defined by a dynamic power demand signal from the mixer system.

This study provides the selected measurement data, showing power consumption by the driving units in a prototype turbine mixer, used in laboratory conditions. The experimental program utilizes a state-of-the-art microprocessor system for measuring the parameters having relevance to power consumption by the mixer drive. Measurement signals of power demand by a paddle stirrer and a rotor are analyzed. Testing was done for variable moisture content in molding sands containing different kind of betonies and for variable mixer pan loads. The methodology is supported by measurements of sand properties by conventional methods. The complete set of data and interrelations holding between them is utilized to describe the investigated processes in terms of dynamic systems, in accordance with the rules of automation. Attention is given to practical applications of the power measurement method in the analysis of mixing dynamics, in control of water-feeding system and in evaluation of energy demand for the process.

The proposed methodology enables the comprehensive evaluation and selection of constructional parameters of devices of sand preparation systems. Most systems used in control of sand preparation processes are based on the relationships between sand parameters and its moisture content. Moisture measurements are taken with various types of sensors placed inside the mixer or also at selected points of the sand preparation line [2, 3, 4, 5, 9, 17,21]. Besides, there are automatic systems for measuring the sand's technological parameters used for online monitoring of the sand being prepared and for process control (online updating of the amounts of ingredients to be fed). An example here is the Multi controller system SMC-PRO [21]. The concept of measuring the selected parameters of power demand during the mixing process is not entirely new. The method was already described in earlier source materials [8, 20, 22], yet recent development of microprocessor systems offers new opportunities in this field [3, 7, 14].

Older publications lack the profound analysis of measurement data, chiefly because of limited accuracy levels and long response times of measurement devices used previously. Applications of the measurement signals of the mixer drive's power components to the assessment of the sand condition and to the control of sand preparation processes were explored in previous publications by the authors [e.g. 7, 12, 13, 14], which present the newly-designed original microprocessor system for implementation of such measurements and explore the basic relationships associated with power demand parameters to be handled by the dedicated software [14]. Power measurements of the mixer's drive are given below, tests were run on a turbine mixer based on a paddle mixer MS 75 [16], used in laboratory applications. The test rig is intended for testing the system for measurements of power components. One has to bear in mind, however, that each measurement method has its advantages and limitations [2, 4, 9,12, 14]. Combining several methods may improve the accuracy of sand quality assessment and help in monitoring of the sand preparation system. This study shows the measured power demand parameters of the drive unit in a laboratory mixer incorporating a paddle stirrer MS 75 [16]. The experimental setup was designed to test the measurement system. Besides, detailed analysis of previously collected data [7, 11, 12, 13], supported by new experimental results enables the identification of processes involved in molding sand mixing.

3.8 Evaluation of selected parameters of sand preparation processes basing on dynamic power measurements:

The tested mixer was engineered by providing a paddle mixer MS 75 [16] with a rotor and drive and with a water feeding system. The design of the rotor's drive allows for varying the inclination angle of the rotor axis and the rotor can be replaced by that having a different shape. In terms of its functional features, this mixer is an equivalent of the turbine mixer WM, manufactured by Kunkel Wagner [20].

Variations of the rpm speed of the paddle stirrer's drive and of the rotor are made possible by the use of frequency converters. The diagram of the measurement the versatility of metal casting is demonstrated by the number of casting and molding processes currently available. This wide range of choices offers design engineers and component users enormous fl edibility in their metal forming needs (Fig. 1). Each process offers distinct advantages and benefits when matched with the proper alloy and application. When reviewing these processes and determining which best suits your needs, consider the following: • required surface quality; • required dimensional accuracy; • type of pattern/core box equipment; • cost of making the mold(s); • how the selected casting process will affect the design of the casting. Molding processes can be broken into four general categories: sand casting processes; permanent mold processes; ceramic processes; and rapid prototyping. Following is a look at the most common casting processes.

3.9 Sand casting:

Fundamentally, a mold is produced by shaping a refractory material to form a cavity of desired shape such that molten metal can be poured into the cavity. The mold cavity needs to retain its shape until the metal has solidified and the casting is removed. This sounds easy to accomplish, but depending on the choice of metal, certain characteristics are demanded of the mold. When granular refractory materials, such as silica, olivine, chromate or zircon sands, are used, the mold must be: • strong enough to sustain the weight of the molten metal; • constructed to permit any gases formed within the mold or mold cavity to escape into the air;

3.10 Engineered casting solutions:

The versatility of metal casting is demonstrated by the number of casting and molding processes currently available. This wide range of choices offers design engineers and component users enormous flexibility in their metal forming needs .

Each process offers distinct advantages and benefits when matched with the proper alloy and application. When reviewing these processes and determining which best suits your needs, consider the following: • required surface quality; • required dimensional accuracy; • type of pattern/core box equipment; • cost of making the mold(s); • how the selected casting process will affect the design of the casting. Molding processes can be broken into four general categories: sand casting processes; permanent mold processes; ceramic processes; and rapid prototyping. Following is a look at the most common casting processes.

3.11Guide to Casting and Molding Processes:

Type of pattern and core box equipment needed • Cost of making the mold(s) • How the selected process will affect the design of the casting Understanding the 'metal casting' basics can help you design for manufacturability and utilize processes that meet your specific c requirements.• resistant to the erosive action of molten metal during pouring and the high heat of the metal until the casting is solid; • collapsible enough to permit the metal to contract without undue restraint during solidification; • able to cleanly strip away from the casting after the casting has sufficiently cooled; • economical, since large amounts of refractory material are used.

3.12 Green Sand Molding:

The most common method used to make metal castings is green sand molding. In this process, granular refractory sand is coated with a mixture of betonies clay, water and, in some cases, other additives .The additives help to harden and hold the mold shape to withstand the pressures of the molten metal .The green sand mixture is compacted by hand or through mechanical force around a pattern to create a mold. The mechanical force can be induced by slinging, jolting, squeezing or by impact/impulse. The following points should be taken into account when considering the green sand molding process: • for many metal applications, green sand processes are the most cost-effective of all metal forming operations; 1.

These processes readily lend themselves to automated systems for high-volume work as well as short runs and prototype work; • in the case of slinging, manual jolt or squeeze molding to form the mold, wood or plastic pattern materials can be used. High-pressure, high-density molding methods almost always require metal pattern equipment; • high-pressure, high-density molding normally produces a well-compacted mold, which yields better surface finishes, casting dimensions and tolerances; • the properties of green sand are adjustable within a wide range, making it possible to use this process with all types of green sand molding equipment and for a majority of alloys poured.

3.13 Chemically Bonded Molding Systems:

This category of sand casting processes is widely used throughout the metal casting industry because of the economics and improved productivity each offers. Each process uses a unique chemical binder and catalyst to cure and harden the mold and/or core. Some processes require heat to facilitate the curing mechanism, though others do not.

3.14 Shell Process:

In this process, sand is pre-coated with a phonetic novella resin containing a hexamethylenetetramine catalyst. The resin-coated sand is dumped, blown or shot into a metal core box or over a metal pattern that has been heated to 450-650^{0}F (232-343^{0}C). Shell molds are made in halves that are glued or clamped together before pouring. Cores, on the other hand, can be made whole, or, in the case of complicated applications, can be made of multiple pieces glued together. Benefits of the shell process include:• an excellent core or mold surface, resulting in good casting finish; • good dimensional accuracy in the casting because of mold rigidity; • storage for indefinite periods of time, which improves just-in-time delivery; • high-volume production; • selection of refractory material other than silica for specialty applications; • a savings in materials usage through the use of hollow cores and thin shell molds.

3.15 Advantages for a range of metal forming applications. Benefits include:

• superior mechanical properties because the metal mold acts as a chill; • uniform casting shape and excellent dimensional tolerances because molds are made of metal; • excellent surface finishes; • high-production runs; • the ability to selectively insulate or cool sections of the mold, which helps control the solidification and improves overall casting properties.

3.16 Mold Casting (LPPM):

In this process, low pressure is used to push the molten metal (and/or a vacuum is used to draw the metal) into the mold through a riser tube as the furnace is below the mold cavity. The amount of pressure, from 3-15 psi, depends on the casting configuration and the quality of the casting desired. When internal passageways are required, they can be made by either mechanically actuated metal inserts or sand cores. The goal of this process is to control the molten metal flow as much as possible to ensure a tranquil fill of the mold cavity. Nearly all of the LPPM castings produced are made of aluminum, other light alloys and, to a lesser extent, some copper-base alloys. Because it is a highly controllable process, LPPM offers the following advantages: • when molten metal is fed directly into the casting, excellent yields are realized, and the need for additional handwork is reduced; • odd casting configurations and tooling points for machining can be placed in areas where gates and risers normally would be placed; • the solidify action rate in various sections of the casting can be controlled through selective heating or cooling of the mold sections, thus offering excellent casting properties; • surface finish of castings is good to excellent.

3.17 Sand Casting (R P process):

In sand casting, RP-generated parts can be used as patterns for fabricating a sand mold. RP processes that use a material similar to wood are common. The molds are created in a fraction of the time and then affixed to the pattern board before sand is packed around to create half of a mold cavity.

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To save even more time, RP processes can be used to directly fabricate molds and cores. These processes build the cores and molds layer-by-layer by fusing either polymer-bonded sand together or using a wide-area inkjet to bond the sand. The molds and cores also may be created by forming a block of sand and machining out the cavity.

4.1 FLY ASH ANALYSIS:

Table 4.1 Composition of fly ash used as reinforcement in weight %

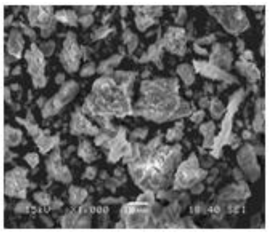


Fig 4.1 Micrograph of fly ash used in the study

4.2 Particle size analysis of fly ash

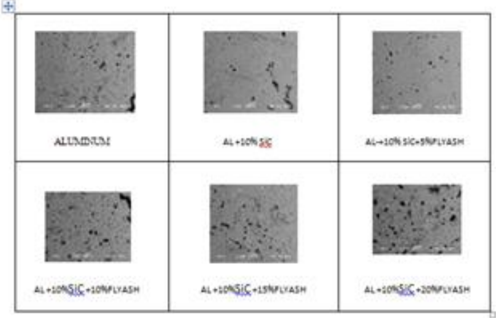
Fly ash from NTPC paravada, visakhapatnam (India) had a wide particle size distribution. The particle size of the fly as received condition, lies in the range from (0.1-100 µm).The micro-graph of the fly ash is shown in fig. The major components of fly ash as received from the source and used for reinforcement are listed in Table in wt%. The fly ash consist mainly Al_2O_3 (28.22 wt %) and SiO_2 (59.96wt %).

Table: 4.2 The chemical composition of aluminum alloy

Weight %	Al	Si	Fe	Cu	Mn	Cr	Mg	Zn	Ti	Others each	Others otal
Alloy He-30	BAL	0.7-1.3	0.50 max	0.10 max	0.4-1.00	0,25 max	0.06-1.2	0.20 max	0.10 max	0.05 max	0.15 max

Compounds	Percentages (%)
SiO_2	59.96
Al_2O_3	28.22
Fe_2O_3	8.85
TiO_3	2.75
Lass of ignition	1.43

4.2 Metallographic of casted composites



The metallographic images of Al-fly ash composites are shown in fig. The size, density, type of reinforcing particles, and its distribution have a pronounced effect on the properties of particulate composites. The variables affecting the distribution of particles are solidification rate, fluidity, type of reinforcement, and the method of incorporation. It is essential to get particles uniformly throughout the casting during particulate composite production. The first task is to get a uniform distribution of particles in the liquid melt and then to prevent segregation/agglomeration of particles during pouring and progress of solidification. One of the major requirements for uniform distribution of particles in the melt is its wettability. The micro structure of the samples, cut from the plate casting at different locations, were observed to study the particle distribution The particles were segregated at the top, bottom, and sides of the plates. The interior of the casting also contained fly ash and Al_2O_3 equally distributed particles, whereas in the case of Alloy+10% Al_2O_3+20% fly ash were present more or less equally throughout the casting. The particle distribution strongly influences the density of composites. Thus, the density distribution can be used as a measure of particle distribution.

4.3 Mechanical properties of cast composites

For the experimental process the following tests are conducted to find results

4.4 Tensile test

Specimen geometry as per ASTM A- 370

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Gauge length (G) = 16 mm	Diameter of reduced section (D_1) = 4mm
Distance between shoulders (B) = 28mm	Grip diameter (D_2) = 8mm
Length of reduced section (A) = 20mm	Radius of curvature (R) = 4mm

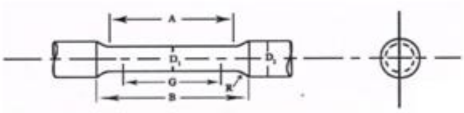
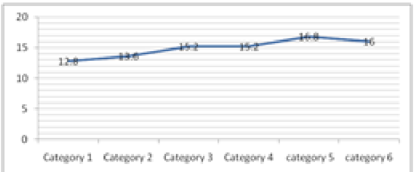


Fig 4.3 Tensile Specimen Geometry

Table 4.3 ConstantSiC at different wt% of fly ash Tensile Test

SL. NO	COMPOSITION	ULTIMATE LOAD KG	YIELD LOAD KG	BRAKING LOAD KG	YIELD STRESS N/mm²	ULTIMATE STRESS N/mm²
1	ALUAMINUN	160	140	110	120	128
2	AL +10%SiC	170	155	120	124	136
3	AL-ALLOY+10%SiC+5%FLY ASH	190	170	120	136	152
4	AL-ALLOY+10% SiC+10%FLY ASH	190	165	120	132	152
5	AL-ALLOY+10% SiC+15%FLY ASH	210	175	140	140	168
6	AL-ALLOY+10%SiC +20%FLY ASH	200	180	150	144	160



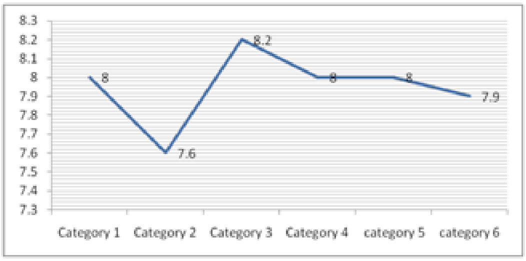
Graph: 4.1 Ultimate tensile strength at different wt % of fly ash

From the above table which has been observed that the tensile strength of the metal matrix composition material will increases due to resistance to the dislocations and hence the strength increases with increases in weight% but at 20% of fly ash the tensile strength has came down due to the poor wet ability This indicates that the fly ash addition leads to improvement in the ultimate tensile strength. Form the table it is clear that addition of Mg improve the tensile properties of the composite.

The size range of the particles is very wide. The size ranges of the fly ash particles indicate that the composite prepared can be considered as dispersion strengthened as well as particle reinforced composite. As is seen from the particle size distribution there are very fine particles as well as coarse ones (1-100 µm). Thus the strengthening of composite can be due to dispersion strengthening as well as due to particle reinforcement. Dispersion strengthening is due to the incorporation of very fine particles, which help to restrict the movement of dislocations, whereas in particle strengthening, load sharing is the mechanism.

4.5 Hardness test Table 4.4

SL NO	COMPOSITION OF AL-ALLOY	HRB SCALE Load applied	AVERAGE LOAD	BHN
1	AL-ALLOY	43/50/50	46.5	80
2	AL-ALLOY+10%SiC	53/45/39	42	76
3	AL-ALLOY+10%SiC +5%FLY ASH	53/46/49	49.3	82
4	AL-ALLOY+10%SiC +10%FLY ASH	44/55/43	47.3	80
5	AL-ALLOY+10%SiC +15%FLY ASH	45/47/49	47.3	80
6	AL-ALLOY+10%SiC +20%FLY ASH	45/44/49	46	79



Graph 4.2 Showing variations in hardness with composition of MMCs

The above table shows that incorporation of fly ash particles in Aluminum Alloy matrix causes reasonable increase in hardness. The strengthening of the composite can be due to dispersion strengthening as well as due to particle reinforcement.

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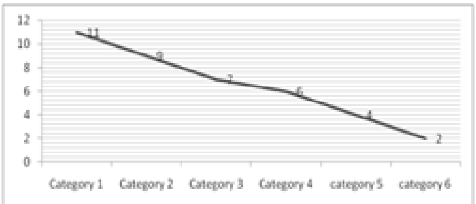
Thus, fly ash as filler in Al casting reduces cost, decreases density and increase hardness which are needed in various industries like automotive etc.

SL. NO	COMPOSITION	ULTIMATE LOAD KG	EXPERIMENTAL ULTIMATE STRESS N/mm2	FROM ANSYS ULTIMATE STRESS N/mm2	YIELD LOAD KG	EXPERIMENTAL YIELD STRESS N/mm2	FROM ANSYS YIELD STRESS N/mm2
1	ALUAMINUN	160	128	141	140	120	123
2	AL +10%SiC	170	136	149	155	124	136
3	AL-ALLOY+10%SiC+5%FLY ASH	190	152	167	170	136	150
4	AL-ALLOY+10% SiC+10% FLY ASH	190	152	167	165	132	145
5	AL-ALLOY+10% SiC+15% FLY ASH	210	168	185	175	140	154
6	AL-ALLOY+10%SiC +20%FLY ASH	200	160	180	180	144	159

4.6 Elongation test

Table 4.5 Elongation on different wt % of fly ash



Graph 4.3. Variation of Elongation with different wt% of fly ash

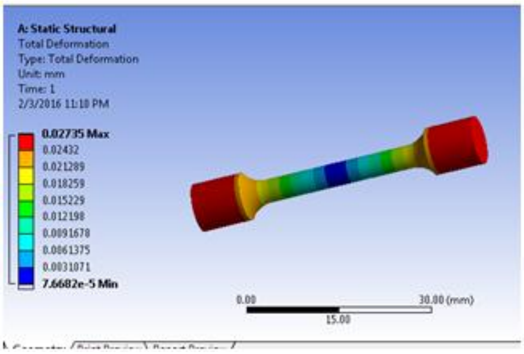
From the above fig it has been observed that the % Elongation decreases with the addition of Al_2O_3 And fly ash reinforcement material. Because the hardness restricts the elongation and hence reducing the ductility of material.

ANSYS RESULTS:

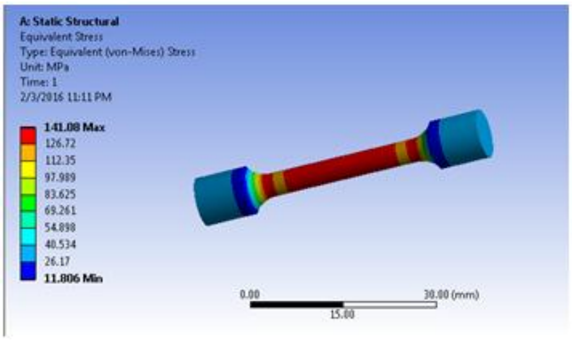
Results for Ansys:

Case 1:

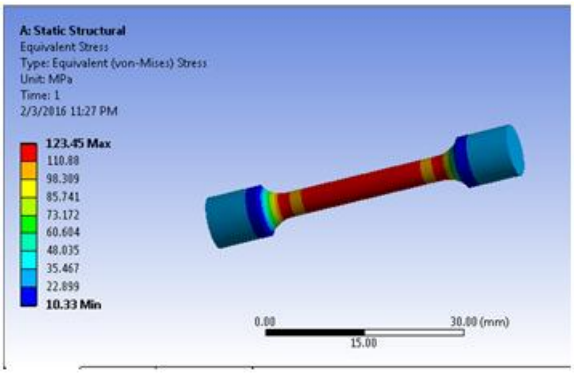
Deformation:



Ultimate Stress:



Yield Stress:



Conclusions & Future Scope of Work:

From the above experiment I can conclude that aluminum composite material can be easily prepared by stir casting method .And microstructure study shows the near uniformly distributed phases in the metal matrix. The mechanical properties like tensile strength and hardness increases with increases with increase in wt% addition of Fly ash. While at the other end ductility will get reduced. The poor wet ability of the phase. In the matrix is the major problem at the higher weight fraction of reinforcement due to this problem the strength decreases after certain limit. From this problem we can overcome by adding small amount of Magnesium and by pre heating the composites and the mould. The flowing conclusion may be drawn form the present work: From the study it is concluded that we can use fly ash for the production of composites and can turn industrial waste into industrial wealth. This can also solve the problem of storage and disposal of fly ash.

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Fly ash up-to 20% by weight can be successfully added to commercially aluminum by stir casting route to produce composites. Addition of magnesium and silicon improves the wet ability of fly ash with aluminum melt and thus increases the retention of the fly ash in the composite. Hardness of commercially aluminum is increased from 76BHN to 81BHN with addition of fly ash and magnesium. The Ultimate tensile strength has improved with increase in fly ash content. Whereas ductility has decreased with increase in fly ash content. The poor wet ability of the phase. In the matrix is the major problem at the higher weight fraction of reinforcement due to this problem the strength decreases after certain limit. From this problem we can overcome by adding small amount of Magnesium and by pre heating the composites and the mould.

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