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A Review of Behavior of AMMC Reinforced with Rise Husk Ash Using Response Surface Methodology

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Abstract- This paper presents Fly Ash brick properties, manufacturing process material required for preparing the clay bricks and fly ash bricks as per Indian standard code provisions, inspection and quality control. The textures of the bricks with Fly Ash were very similar to that of clay bricks; the sample with the additive contains spherical Fly Ash particles. These particles of Fly Ash led to a reduction in the density of the bricks and a substantial improvement in their durability. Use of this additive could have practical implications as a means of recycling and for achieving cost savings in brick production. The absorption coefficient, shape and size, density, weight, porosity, thermal conductivity and compressive strength of Fly Ash bricks compare with normal clay bricks that delivered good results. From the present study, it can be concluded that Fly Ash bricks used as an alternative to clay bricks.
Keywords: Fly Ash Brick, Compressive Strength, Absorption Coefficient, Clay Bricks

1. INTRODUCTION OF COMPOSITE

Materials have such an importance in our life that the historical period of humankind have been dominated and named after materials. As the archaeological system that divides the span of mankind in three era Stone Age, Bronze Age and Iron Age. After that, technology grows with the applications of steel, aluminum and alloys. Over the last forty years composite material, plastic and ceramic materials have been dominant engineering materials. A composite is the combination of two or more different materials to create a superior and unique material. Actually composite is naturally available in both human beings and plants. Wood is a composite made up of long Cellulose fibers held together by a much weaker substance called lignin. Two weak Substances lignin and cellulose together form a much stronger one. The bone in our body is also a composite. It is made from a hard but brittle material called hydroxyl apatite (which is mainly calcium phosphate) and a soft and flexible material called collagen (which is a protein).

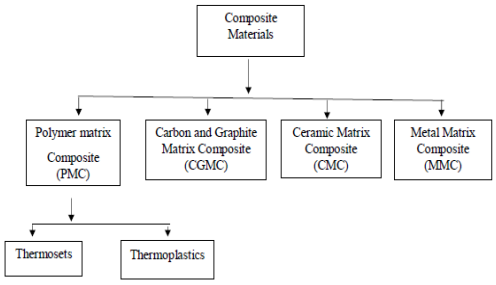
2. WHY COMPOSITES ARE IMPORTANT

The biggest advantage of modern composite materials is that they are light as well as strong. By choosing an appropriate combination of matrix and reinforcement material, a new material can be made that exactly meets the requirements of a particular application. Composites also provide design flexibility because many of them can be molded into complex shapes. The downside is often the cost. Although the resulting product is more efficient, the raw materials are often expensive. Some other important factors are as follows

Composites have high stiffness, strength, and toughness, often comparable with structural metal alloys. Further, they usually provide these properties at substantially less weight than metals: their “specific” strength and modulus per unit weight is near five times that of steel or aluminum. This means the overall structure may be lighter, and in weight-critical devices such as airplanes or spacecraft this weight savings might be a compelling advantage.

3. CLASSIFICATION OF COMPOSITE ON THE BASIS OF MATRIX

Composites are commonly classified at two distinct levels. The first level of classification is usually made with respect to the matrix constituent.



Metal Matrix Composites (MMC)

High strength, fracture toughness and stiffness are offered by metal matrices than those offered by their polymer counterparts. They can withstand elevated temperature in corrosive environment than polymer composites. Most metals and alloys could be used as matrices and they require reinforcement materials which need to be stable over a range of temperature and non-reactive too. However the guiding aspect for the choice depends essentially on the matrix material. Light metals form the matrix for temperature application and the reinforcements in addition to the above mentioned reasons are characterized by high module.

Most metals and alloys make good matrices. However, practically, the choices for low temperature applications are not many. Only light metals are responsive, with their low density proving an advantage. Titanium, Aluminum and magnesium are the popular matrix metals currently in vogue, which are particularly useful for aircraft applications. If metallic matrix materials have to offer high strength, they require high modulus reinforcements. The strength-to-weight ratios of resulting composites can be higher than most alloys.

4. LITERATURE REVIEW

D. Lingaraju et al review the work on Rice Husk Ash Reinforced in Al Metal matrix Nano composite. He found that the mechanical properties of the metal reinforced composite shows improvement with the inclusion of nanoparticles. General properties like tensile strength, hardness will increase by increasing the reinforcement content in less quantity. The use RHA ash for the production of composites can turn agricultural waste into industrial wealth. This can also solve the problem of storage and disposal of RHA.

K.K. Alaneme et al studied about the influence of rice husk ash –silicon carbide weight ratio on the mechanical behavior of Al-Mg-Si alloy matrix hybrid composite reported thatthere is a general increase in tensile strength, and yield strength with increase in weight percent of the RHA-SiC hybrid reinforcement. However, the tensile and yield strength decreases with increase in the weight proportion of RHA in the RHA-SiC reinforcement.

L. Prince Jeya La et al Fabricate Aluminum hybrid composites by Stir Casting Technique in his work Al356 is reinforced with SiC and B4C to enhance the mechanical properties, surface hardness and wear resistance. Comparison is done between the wear rates of hybrid and binary composites and it was evident that the wear rate occurring in hybrid is less than the binary composite. The wear coefficients were also compared and it was found that, hybrid composite has better wear properties when compared to binary composites.

M. Rajkumar Reddy et al Reported the fabrication of aluminum alloy (Al6061) metal matrix reinforce with locally available inexpensive rice husk and fly ash. A rice husk and fly ash particles of 5%, 10% and 15% each by weight are proposed to develop metal matrix composites using stir casting technique.

L. Francis Xavier et al Investigate the Wear Behavior of Aluminum Metal Matrix Composite Prepared from Industrial Waste in his work Aluminum Metal Matrix Composite is prepared by reinforcing 10 wt% and 20 wt% of wet grinder stone dust particles an industrial waste obtained during processing of quarry rocks which are available in nature. Dry sliding wear test was carried out using pin-on-disc apparatus on the prepared composites. The results reveal that increasing the reinforcement content from 10 wt% to 20 wt% increases the resistance to wear rate.

Debashish Dash et al performed experimental analysis which shows that Al-Si Alloy based MMC reinforced with fly ash and rice husk ash have a better tribological behaviour as compared to the Al-Si alloy. The wear test was carried out using pin-on-disk machine with a constant load of 30N with varying sliding speed**.**

SooryaPrakash Kumarasamy et al worked on characterization of a novel hybrid Aluminum Metal Matrix Composite (AMMC) developed through two-step compocasting method by reinforcing constant amount of flyash cenosphere (10%) and varying quantity of graphite (2%, 4% and 6%) in Al7075 matrix. Results revealed that reinforcement particles have enhanced the tensile strength of Aluminum

matrix from 178 N/mm^2 to 213 N/mm^{2}as of the composite is concerned.

Md. HasibulHaqueet al conduct analysis of mechanical properties on metal matrix composite of A-356.2 alloy reinforced with rice husk ash (RHA) particles synthesized by stir casting technique. He found that incorporation of rice husk ash particles in aluminum matrix can lead to the production of low cost aluminum composites with improved hardness and strength.

5. CONCLUSIONS AND OBJECTIVE OF PRESENT WORK

- Reduction of fuel consumption and vehicle emissions is major challenge in front of automotive industry. Which can achieved by reducing weight of vehicle and frictional losses in engine.
- standard materials used in engine industry (grey cast iron and steel). These matrials are very high mass, and decrease the efficiency,
- Hardness measurement of as prepared composites.
- Experimentally perform tribological analysis of composite and observe effect of varying percentage of RHA in wear behavior of composite.
- Analysis of Wear behavior of Aluminum Metal Matrix Composite by Response Surface Methodology (RSM).

REFERENCES

[1] D. Dash, S. K.Sahu, A comparative investigation on tribologicalproperties of Al-Si alloy based MMC reinforced with waste materials IOP Conf. Series: Materials Science and Engineering 410, 2018.

[2] S.P. Kumarasamy, K.Vijayananth,T. Thankachan, Investigations on mechanical and machinability behavior of aluminum/flyashcenosphere/Gr hybrid composites processed through compocasting, Journal of Applied Research and Technology 2018

[3] Md. HasibulHaque, RaminAhmed, Md. Muzahid Khan, S. Shahriar,Fabrication, Reinforcement and Characterization of metal matrix composites (MMCs) using rice husk ash and aluminum alloy (A-356.2), International Journal of Scientific & Engineering Research, Volume 7, Issue 3, March-2019

[4] J. Eric David Praveen, D.S. Robinson , R.Babu and A. Vijin Prabhu, Investigation on wear behavior of LM13/SiC Aluminium metal marix composite by response surface methodology, International Journal of Mechanical Engineering and Technology Volume 8, Issue 6, June 2019, pp. 530–543

[5] Sada, So, Use of Response Surface Optimization Technique in Evaluating the Tool Wear in a Turning Machine Cutting Process,J. Appl. Sci. Environ. Manage.Vol. 22 (4) 483 – 487 April 2020

[6] Scanning electron microscopy; Johan Borjesson,Dept. Applied Physics. 2021

[7] William R. Herguth, President, Guy Nadeau. Applications of scanning electron microscopy and energy dispersive spectroscopy(SEM/EDS) to practical tribology problems. Senior Technical Associate Herguth Laboratories, Inc. Electron microscopy the basics; BettinaVoutou, Aristotle University of Thessaloniki, Greece.