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Engineering

# FABRICATION AND WEAR STUDIES OF BLAST FURNACE SLAG PARTICLES REINFORCED LM25 COMPOSITE FOR TWO-WHEELER CLUTCH PRESSURE PLATE

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**ABSTRACT** Blast furnace emerges as the major waste material during production of pig iron by reduction the iron ore in the blast furnace. It comprises of many oxides. During this we have been faced enormous effort towards the blast furnace. Generally we used reinforced material for increasing wear resistance. But these are very cost. Present research work has been undertaken by this cost factor.

**KEYWORDS :** Blast –furnace, rein– forcement, oxides, cost

## 1. INTRODUCTION

A vast range of MMC materials has been conceived and studied. By far, the largest commercial volumes are for Aluminum matrix composites (AMCs), which accounts for 69% of the annual MMC production by mass. To produce these composites, both solid and liquid phase processing methods have been used; the later has the advantages that the fluidity of the metal allows for the use of a wide range of reinforcements and the capability of producing near net shaped casting. The major problem in fabricating metal matrix composites by liquid phase is the poor readability which leads to the non-uniform distribution of the particles.

Vortex (liquid phase processing) technique involves incorporating of ceramic particulates into molten alloy using the rotating impeller. Normally, micro-ceramic particles are used to improve the hardness and ultimate strength of the metal. However, the ductility of the MMCs deteriorates with high ceramic particle concentration .

## 2. OBJECTIVES OF THE PRESENT WORK

The present work is aimed on the utilization of abundantly available industrial waste BF Slag in useful manner by dispersing it into aluminum to produce AA356 –blast furnace slag composite. And compare the AA356 alloy and AA356 – 5% coarse and fine particle composite. Following are the objectives of the present investigation

1. Synthesis of AA356 Alloy and micro composites.
i. Preparation of AA356 alloy.
ii. Preparation of blast furnace slag powders.
iv. Synthesis of coarse blast furnace composites (CBFC).
iii. Synthesis of fine blast furnace slag composites.

2. Characterization of blast furnace slag powder.
3. Characterization of Aluminium blast furnace slag coarse and fine composites;
i. Microstructure studies (SEM – EDX and XRD studies).
ii. Mechanical properties Studies.
iii. Studies on corrosion behavior of the AA356 alloy and Aa356 – blast furnace slag composites.
4. Wear studies

## 3. Table.

**Chemical composition of Al – 4.5% Cu – 2 Mg alloy**
**Chemical composition of as received blast furnace slag, wt. %**

| CaO | SiO2 | Fe2O3 | Al2O3 | MnO | Loss on Ignition |
|---|---|---|---|---|---|
| 39.2 | 40.0 | 1.8 | 13.5 | 0.76 | 0 |

## 4. Figures

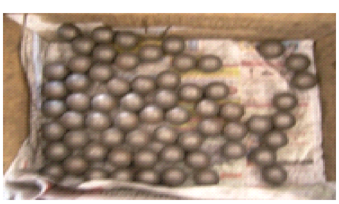


**Fig 1 Representative of balls used for making blast furnace Slag fine powder.**

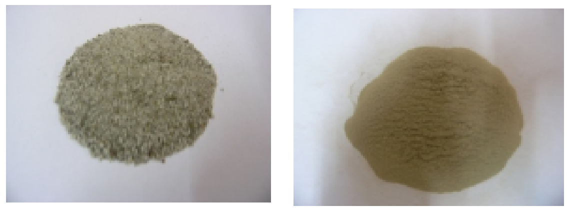


**Fig 2 The blast furnace slag powder used for synthesis of ALBF slag composites (a) as received Condition (b) after heat treatment condition**

**Fig 3 Representative motions inside the jar of ball mill.**

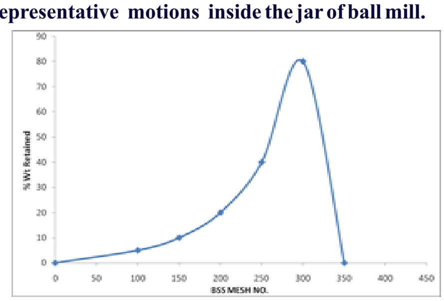
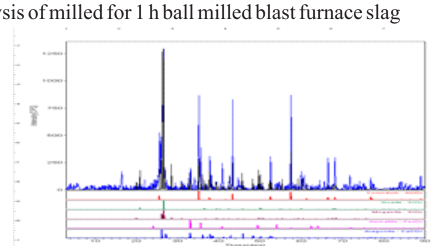



**Fig 4 Distribution of blast furnace slag particles on sieving for the period**

## RESULTS & DISCUSSION

But Bysing tensil test , density measurement and XRD studies XRD analysis of milled for 1 h ball milled blast furnace slag



These samples are set into the XRD sample holder . Generally there are two types of sample holders, one is for characterizing the powder sample which is having dimensions of 20x20mm with 0.3mm depth and the other is for solid sample which is having a centered hole with 20x20mm..The XRD is power on and the voltage and the current values are set to standard values i.e. 40kV and 20mA.

We test all the properties like hardness, stiffness, tensile stress and wear test .collecting all the data with graphically and manually..

## 5. CONCLUSION

From the EDX analysis of composites shows that no oxygen peaks were observed in the matrix area, confirming that the fabricated composite did not contain any additional contamination from the atmosphere. This might be due to a shield of argon gas was maintained during the mechanical stirring while reinforcement addition. The hardness of the composites increased with increasing the amount of slag than the base alloy.The tensile properties like ultimate tensile strength and yield strengths were enhanced due to hard reinforced slag particles.

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