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Experimental Investigation of Aluminium 7075-Bagasse Ash-Graphite Composites

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Abstract

Aluminium composites are considered as one of the advanced engineering materials which have attracted more and more benefits. The integration of hard ceramic phase to a comparatively soft matrix alloy like aluminium increases the strength, creep performance, and wear resistance of the alloy. Moreover, they exhibit light weight which make these materials suitable for many applications such as automotive and aerospace applications. They are extensively used as pistons, connecting rods, brake rotors, and drive shafts. Currently, the researchers are focusing in producing low cost composites. Stir casting technique is the simplest and the most economical process for fabricating particulate reinforced MMCs. In the present investigation bagasse ash and graphite with different percentages were utilized as reinforcing material along with Al7075 as matrix material. The ultimate tensile strength and hardness increases whereas the percentage of elongation decreases with increase in bagasse ash and graphite.

Keywords-Graphite, Bagasse Ash, Ultimate Tensile Strength, % Elongation and Yield Strength

I. INTRODUCTION

Irregularly strengthened aluminum (DRA) grid composites have developed as cutting edge composite material attributable to its focal points of adaptable preparing, low thickness, high warm conductivity, enhanced quality and extensive variety of utilizations. To enhance mechanical properties and wear resistance of composites,

specialists have successfully scattered diverse fortifications, for example, glass, WC, Sic, Al2O3, powder, coconut shell burn, mica in aluminum compounds by distinctive preparing procedures. As of late half and half composites are picking up notoriety as they cover more than one appealing material property. Endeavors have been made to investigate the conceivable utilization of these composites having hard and delicate fortifications in a few mechanical applications. Expansion of the fortification will upgrade the mechanical properties of aluminum based composite when contrasted with the framework combination of resultant composite. Nonetheless, expansion of any hard fortification to aluminum decreases the erosion resistance, electrical conductivity and surface completion.

Bagasse cinder has high hardness and low coefficient of warm extension, high wear safe furthermore great mechanical properties including high quality and warm conductivity. Graphite is considered as the most critical possibility for strong oil of the clay fortification frameworks.

II. EXPERIMENTAL DETAILS

Half breed Al7075-Graphite-bagasse fiery debris composites were manufactured by mix throwing system utilizing electrical resistance heater. Al 7075 amalgam with 2wt% of Bagasse fiery debris and 2% of Gr were softened in the heater. The composites melt kept up at a temperature of 800^0C was then poured into metallic molds. Further, Al7075 amalgam +4%BA+2%Gr composites were arranged by adding 5% of graphite powder to Al7075 combination +6%BA melt at a temperature of 750 degree.

III. RESULTS AND DISSCUSSION

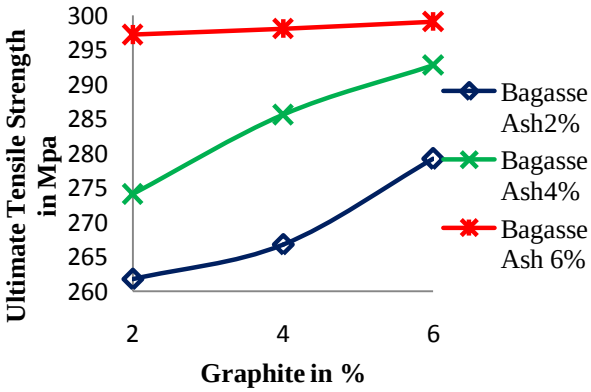

Figure 3.1: UTS v/s Graphite%

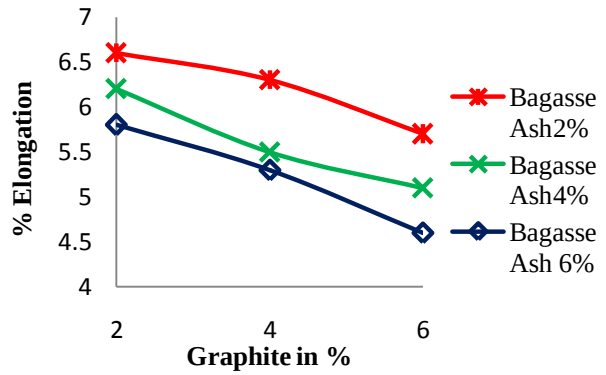

Figure 3.2: % Elongation v/s Graphite%

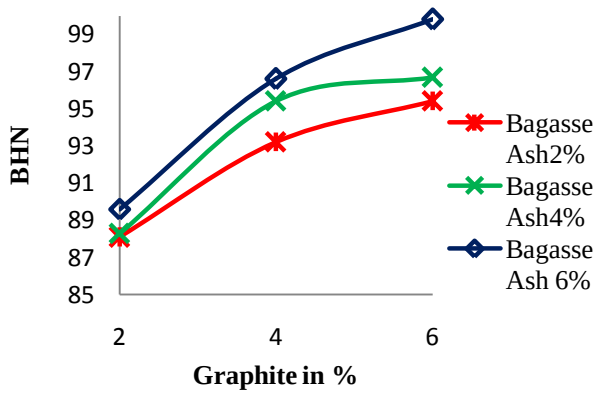

Figure 3.3: BHN v/s Graphite%

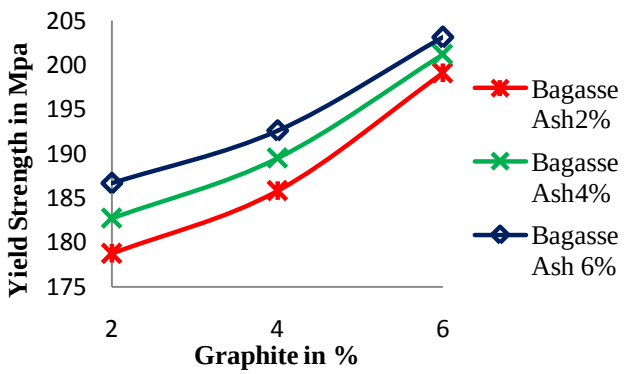

Figure 3.4: Yield Strength v/s Graphite%

It is observed from the Fig 2 that for 2, 4 and 6% graphite and bagasse ash of 6% shows maximum ultimate strength. At 6% graphite and bagasse ash ultimate tensile strength shows a maximum value of 299.1Mpa. It is drawn from the Fig 2.1 that for 2,

4 and 6% graphite and bagasse ash of 6% shows minimum % elongation. At 6% graphite and bagasse ash % elongation shows a minimum value of 4.6%. From the Fig 2.2 that for 2, 4 and 6% graphite and bagasse ash of 6% shows maximum hardness. At 6% graphite and bagasse ash hardness shows a maximum value of 99.8. It is observed from the Fig 2.3 that for 2, 4 and 6% graphite and bagasse ash of 6% shows maximum yield strength. At 6% graphite and bagasse ash yield strength shows a maximum value of 189.5 Mpa.

Table 2: Test Results at different percentage of Alumnium 7075-Graphite-Bagasse Ash Composites

Trial No	Composition		UTS in Mpa	BHN	% Elongation	YS in Mpa
	Gr	Bagasse Ash				
1	2	2	261.8	88.1	6.6	178.7
2	4	2	266.2	93.2	6.3	185.8
3	6	2	279.4	95.4	5.7	199.1
4	2	4	274.1	88.3	6.2	182.7
5	4	4	285.6	95.4	5.5	189.5
6	6	4	292.8	96.7	5.1	201.2
7	2	6	297.2	89.6	5.8	186.7
8	4	6	298.1	96.6	5.3	192.6
9	6	6	299.1	99.8	4.6	203.4

The table 2 shows the overall projection of property variation along with 2, 4 and 6% graphite and bagasse ash.

1. It is observed from the table that for 2% graphite and bagasse ash of 2, 4 and 6% the ultimate tensile strength and hardness shows increasing trend.
2. The percentage elongation shows a decreasing trend for 2% graphite and bagasse ash of 2, 4 and 6%.
3. The ultimate tensile strength and percentage elongation increases to maximum value at higher percentage of graphite.

IV. CONCLUSION

The following conclusions are drawn from the present study:

1. The ultimate tensile strength and hardness shows minimum value which drawn out from the investigation as 261.8Mpa and 88.1 at 2% graphite and bagasse ash
2. The ultimate tensile strength and hardness shows maximum value which drawn out from the investigation as 299.1Mpa and 99.8 at 6% graphite and bagasse ash
3. The % elongation shows minimum value which drawn out from the investigation as 4.6% at 6% graphite and bagasse ash

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