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EFFECT OF SUGARCANE BAGASSE ASH AND MARBLE WASTE IN FLY ASH BRICK

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Abstract – this paper presents the Sugarcane Bagasse Ash (SCBA), Marble Waste, (MW) in construction products. The partial replacement of fly ash and M sand by bagasse ash and marble waste respectively give considerable cost reduction and equal strength-controlled mix. This paper gives a clear idea about the partial replacement of fly ash and M sand by of SCBA and marble waste respectively up to 10%. The study of partially replacing sugarcane bagasse ash useful in the construction industry such as concrete, cement mortar, bricks as well as for environmental protection.

Keywords: Sugarcane Bagasse Ash (SCBA), Marble Waste, (MW), Cement, Fly ash Brick, etc.

I. INTRODUCTION

Construction industry is playing a major role for in the country's economy growth and infrastructure development. In the modern era, concrete has become the most predominant construction building material all over the world. Moreover, it is the scenario to alternative raw material in manufacturing construction material. Sugarcane Bagasse Ash (SCBA) and marble waste are the huge industrial waste. In the view of environmental impact due to dumping industrial wastes in cultivable land, it is required to adopt a sustainable solution for effective disposal of waste. Hence, it is very essential to do these researches and it leads to making use of industrial waste as a raw material in various fields. This paper gives a clear idea about the partial replacement fly ash, M sand by of SCBA marble waste are up to 10% maximum.

II. DESCRIPTION OF MATERIALS

Mix ID	Fly ash (%)	Bagasse ash (%)	M sand (%)	Marble Powder (%)	Cement (%)
CM	50	-	40	-	10
MW10	50	-	30	10	10
MW20	50	-	20	20	10
MW30	50	-	10	30	10
BA10	40	10	40	-	10
BA20	30	20	40	-	10

CM- Controlled Mix, MW- Marble waste, BA – Bagasse ash

Fig 5.1 Brick specimens

Table 4.3 Physical Properties of Fine Aggregate

S. No.	Property	Value Obtained Experimentally
1	Specific gravity	2.7
2	Bulk density loose (kg/m^3) Fully compacted	1550.2998kg/m^3 1750.499kg/m^3
3	Fineness modulus	2.37%
4	Water absorption	1.8 %
5	Grading zone (based on percentage passing0.6 mm)	Zone II

Table 4.5 Physical Properties of Marble Powder

S. No.	Property	Value Obtained Experimentally
1	Specific gravity	2.43
2	Bulk density loose (kg/m^3) Fully compacted	1550.2998kg/m^3 1750.499kg/m^3
3	Fineness modulus	1.50
4	Water absorption	1.8 %

Table 4.7 Physical Properties of Bagasse ash

S. No.	Property	Value Obtained Experimentally
1	Specific gravity	1.94
2	Bulk density (kg/m^3)	550 kg/m^3

III RESULT AND DISCUSSION

COMPRESSIVE STRENGTH

The fly ash bricks were cast with various mix ratios and tested in compression testing machine for 7days, 14days and 28days and corresponding values are tabulated. When considering marble waste alone by replacing conventional fine aggregate (M sand) compressive strength is affected by the incorporation of secondary aggregates and as the replacement ratio increases the compressive strength of all the brick families studied decreases while comparing control mix. Among those different replacement levels 10% replacement gives best result. Similarly, while considering bagasse ash also 10% replacement gives higher strength than 20% level.

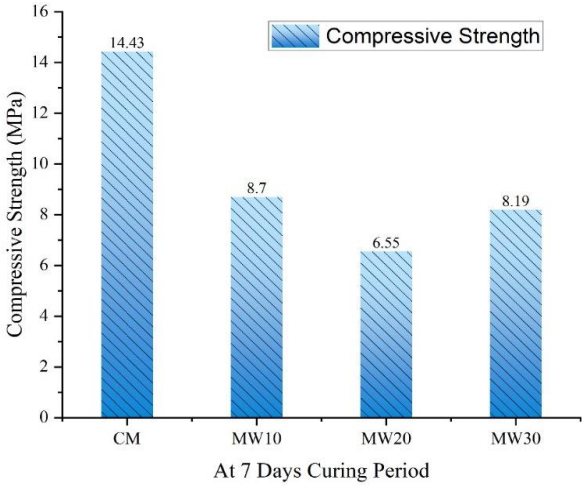

Fig 5.5 Chart – Compressive strength of brick at seven days curing period of MW

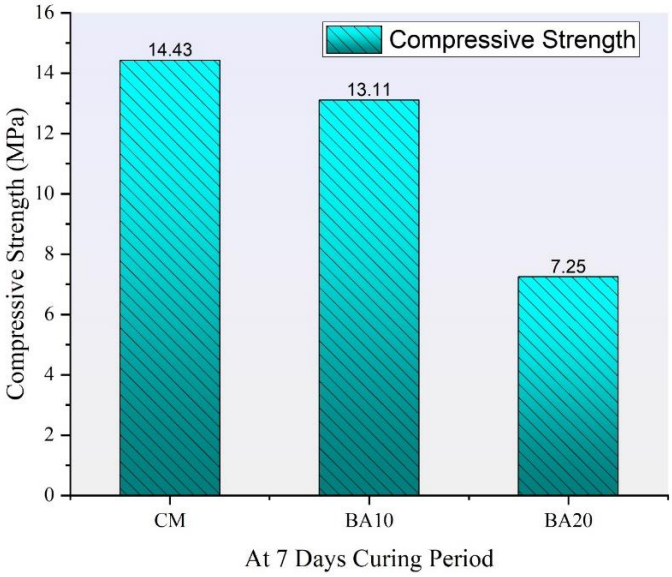

Fig 5.9 Chart – Compressive strength of brick at seven days curing period of BA replaced specimen

But replacement of fine aggregate by marble waste 20% gives higher compressive strength than 10% replacement at 28 days compared to 7 and 14 days strength. From the research we can conclude that we replace fine aggregate maximum up to 20% optimum. But considering cement, bagasse ash maximum replacement value is up to 10% which gives some nearer strength to control mix.

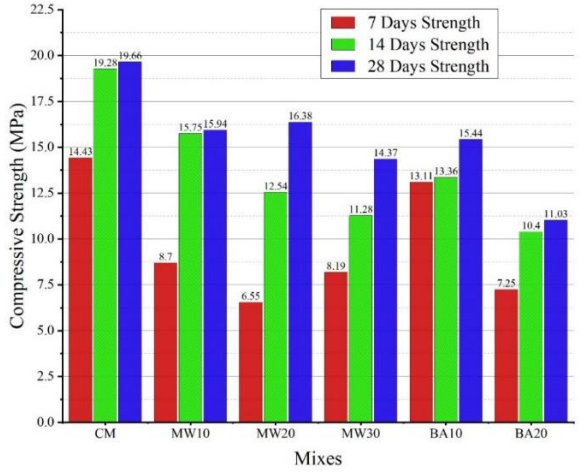

Fig 5.11 Chart - Compressive strength of different brick specimens at 7,14 & 28 days curing period

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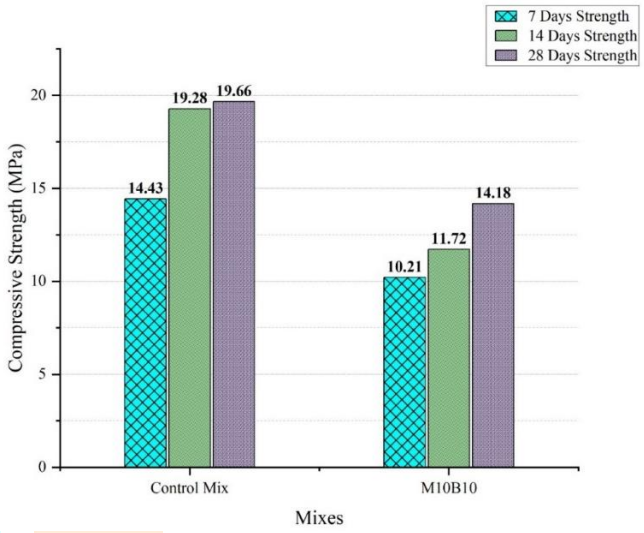
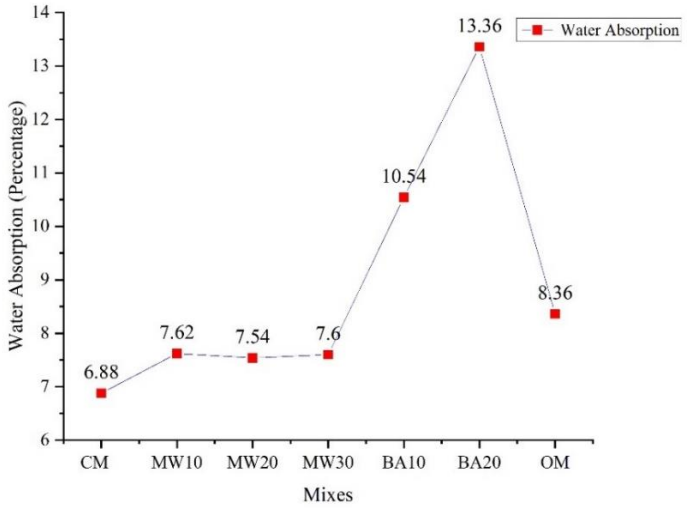


Fig 5.12 Chart - Compressive strength of controlled and optimum mix brick specimens at 7,14 & 28 days curing period

When go for final mix with combination of fly ash, fine aggregate replaced by 10% bagasse ash,10% waste marble respectively gives considerable strength with significant replacement level.

WATER ABSORPTION TEST

According IS 3495 (Part-3) the specimens were dried in a ventilated oven at a temperature of 105 to 115°C till it attains substantially constant mass. Dried specimens immersed completely in clean water at a temperature of 27 f 2°C for 24 hours. Among all the seven different mixes the mix 20% replacement of fly ash by bagasse ash has highest water absorption value. It shows bagasse ash absorb more water. The higher amount marble content also absorbs more water.



V. CONCLUSION

The mechanical performance of fly ash brick containing fly ash, fine aggregate and waste byproducts i.e., marble powder and bagasse ash are generated from marble quarrying and sugar factories fuel byproduct of those respective industry, has been analyzed. After completing the research reported in this paper, the following conclusions can be drawn:

- The replacement of fly ash with bagasse ash, maximum replacement value is up to 10% which gives strength closer to control mix concrete specimen.
- Among different (10%, 20%,30%,40% and 50%) replacement levels, 10% marble waste replacement gives best result. Similarly, 10% replacement bagasse ash also gives higher strength than 20% level of SCBA.

- From the research, it can conclude that replacement of fine aggregate maximum up to 10% (optimum) and fly ash about 10%.
- When go for final mix with combination of fly ash, fine aggregate replaced by 10% bagasse ash,10% waste marble respectively gives considerable strength.
- The replacement of conventional fine aggregate by marble waste gives better result in compressive strength as well as other properties also.
- The brick with fly ash replaced by bagasse ash reduces the self-weight of brick so that leads to light weight brick.
- The brick with fly ash replaced by bagasse ash also shows perfect shape with sharp edges that will ease our construction process.

Finally, specimen replaced by marble waste alone with crusher sand gives nearer value compressive strength of controlled specimen, bagasse ash with fly ash also gives best result as marble waste. The optimum (ratio of MW and BA) final mix gives reasonable replacement with significant compressive strength closer to controlled mix.

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