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Review on fly Ash Concrete & Bagasseash Concreteanalysis for Compressive Strength

KEYWORDS: Fly ash,Compressive strength, Bagasse ash, Cementconcrete

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ABSTRACT *The investigation reported in this paper is carried out to study the utilization of fly ash in cement concrete as a partial replacement of cement as well as an additive so as to provide an environmentally consistent way of its disposal. The cement in concrete matrix is replaced from 5% to 25% by step in steps of 5%. It is observed that replacement of cement in any proportion lowers the compressive strength of concrete as well as delays its hardening.*

In this paper partially replaced in the ratio of 0%, 5%, 15% and 25% by weight of cement in concrete. Hardened concrete tests like compressive strength, split tensile strength, flexural strength atthe age of 7 and 28 days was obtained. The result shows that the strength of concrete increased as percentage of bagasse ash replacement increased.

INTRODUCTION

Fly ash:

Fly ash, also known as flue-ash, is one of the residues generated in combustion, and comprises the fine particles that rise with the flue gases. Ash that does not rise is called bottom ash. In an industrial context, fly ash usually refers to ash produced during combustion of coal.

Fig 1: Fly ash

Fly ash is very much similar to volcanic ashes usedin production of the earliest known hydraulic cements about 2,300 years ago. Fly ash is the best known, and one of the most commonly used, pozzolanas in the world. Researchers have proposed few ways of reusing fly ash for variety of application. One of the most common reuse of fly ash is in cement concrete. Fly ash particles are almost totally spherical in shape, allowing them to flow and blend freely in mixtures

In this experimental investigation, an attempt has been made to study the techno-economic analysis for the compressive strength of fly ash concrete. The fly ash is procured from Deepnagar Thermal Power Plant. It has a generation capacity of 480 MW. It consumes 7500-8500 MT/ day of coal and produces 2550 to 2800 MT/day fly ash. Fly ash is used in various proportions ranging from 10% to 50% by weight of cement in steps of 5%.

Bagasse ash:

A black mountain, comprising 3.8 million tons of ash and the burned remains of sugar cane bagasse; this is the waste produced during a year by the incineration of bagasse in Brazilian sugar and alcohol mills. For some time, industries in the sector have burned bagasse and cane straw to generate electricity for their own consumption, and if there is any excess production, it is sold to third parties

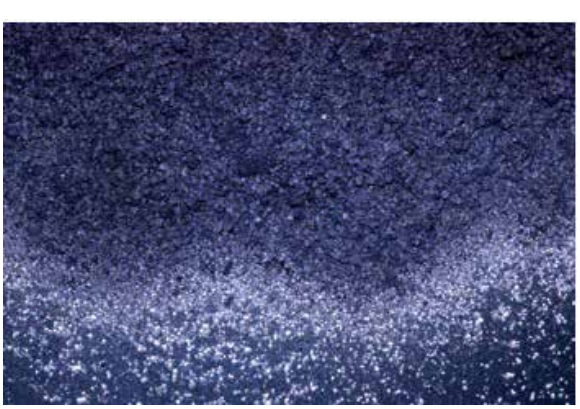

Fig 2:Bagasse Ash

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In This paper analyses the effect of SCBA in concrete by partial replacement of cement at the ratio of 0%, 5%, 10%, 15% and 25% by weight. The experimental study examines the compressive strength, split tensile strength, flexural strength, young's modulus and density of concrete. The main ingredients consist of Portland cement, SCBA (Sugarcane Bagasse Ash Concrete),river sand, coarse aggregate and water. After mixing, concrete specimens were casted and subsequently all test specimens were cured in water at seven and 28 Days.

RESULTS AND DISCUSSION

Compressive strength of fly ash concrete:

The characteristic compressive strength of various blends of concrete is presented in tables

Table 1 : Strength Results of Sugarcane Bagasse Ash Concrete At 7 Day

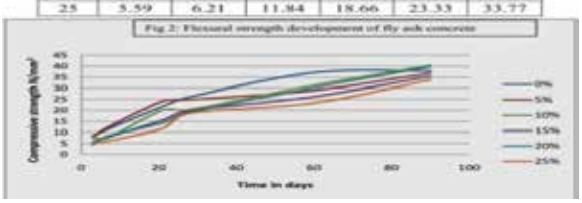
Sample Designation	% of SCBA	Compressive Strength (MPa)	Split Tensile Strength at (MPa)	Flexural Strength (MPa)	Modulus of Elasticity (MPa)	Bulk Density (kg/m³)
C0	0	13.80	0.693	3.63	22800	2535.30
N1	5	15.83	0.97	3.35	23100	2541.23
N2	10	12.33	0.90	3.19	23000	2517.52
N3	15	8.79	0.70	3.04	21900	2494.81
N4	20	8.30	0.65	2.75	20100	2400.01
N5	25	7.55	0.42	2.30	19800	2396.04

Table 2 : Strength Results of Sugarcane Bagasse Ash Concrete At 28 Day

Sample Designation	% of SCBA	Compressive Strength (MPa)	Split Tensile Strength at (MPa)	Flexural Strength (MPa)	Modulus of Elasticity (MPa)	Bulk Density (kg/m³)
C0	0	21.47	1.526	3.460	30010	2546.17
N1	5	29.50	1.94	3.74	29200	2581.72
N2	10	24.70	1.59	3.56	25800	2505.67
N3	15	19.32	1.45	3.38	21000	2429.62
N4	20	18.85	1.34	3.18	19500	2410.21
N5	25	17.73	1.24	3.02	18500	2400.00

Table 2: Compressive strength of cement – fly ash concrete (three sample average)

% FLY ASH	COMPRESSIVE STRENGTH(N/mm²)					
	3 DAYS	7 DAYS	21 DAYS	28 DAYS	60 DAYS	90 DAYS
0	8.44	11.55	21.77	26.06	37.10	37.99
5	8.00	12.44	24.15	24.88	29.00	36.88
10	7.55	7.77	20.14	20.29	31.33	40.44
15	5.77	7.99	15.55	19.86	26.21	35.41
20	4.44	8.44	14.22	19.10	30.22	39.88
25	5.59	6.21	11.84	18.66	23.33	33.77



It can be seen that 0% fly ash i.e. concrete with no replacement of cement with fly ash, has maximum rate of compressive strength development at 60 day and after it becomes nearly constant. 5% fly ash has maximum rate of compressive strength development upto the age of 21 days and then after its rate decreases. Strength development at later stage is negligible. The rate of strength development is large upto 21 days for 10% fly ash and then after its rate

InComparison of the results from the 7, and 28 days samples shows that the compressive strength, tensile strength and also flexure increases with SCBA (Sugarcane Bagasse Ash Concrete) up to 1.0% replacement (N1) and then it decreases, although the results of 2.0% replacement (N4) is still higher than those of the plain cement concrete (C0). It was shown that the use of 2.0% SCBA (Sugarcane Bagasse Ash Concrete) decreases the compressive strength to a value which is near to the control concrete

CONCLUSION

This study proves that Deep Nagar fly ash can be successfully used in the cement concrete in minor amount as an additive. Fly ash is actually a solid waste. So, it is priceless. If it can be used for any purpose then it will be good for both environment and economy. Use of this fly ash as a raw material in Portland cement is an effective means for its management and leads to saving of cement and economy consequently. It can be concluded that power plant waste is extensively used in concrete as a partial replacement for cement and an admixture.

In this Paper the results show that the SCBA(Sugarcane Bagasse Ash Concrete) in blended concrete had significantly higher compressive strength, tensile strength, and flexural strength compare to that of the concrete without SCBA (Sugarcane Bagasse Ash Concrete). It is found that the cement could be advantageously replaced with SCBA (Sugarcane Bagasse Ash Concrete) up to maximum limit of 10%. Although, the optimal level of SCBA(Sugarcane Bagasse Ash Concrete) content was achieved with 1.0% replacement.

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