COMPARSION OF STRENGTH AND DURABILITY PARAMETERS OF HIGH VOLUME FLY ASH CONCRETE AND NORMAL CONCRETE

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ABSTRACT

An experimental research work was carried out focused on the evaluation of the possibility of producing low Portland cement content concrete with enhanced or even high performances, including local by-products such as fly ash and common low cost aggregates without any previous treatment, i.e., as received. Six different concrete mixtures (incorporating large quantities of fly ash) were made and their mechanical, workability and durability properties were characterized. The total cementations content used (350 kg/m3 ,400 kg/m3 ,450 kg/m3, 500 kg/m3 and 550 kg/m3) was composed by 0,10,20,30,40,50,60 percentage of fly ash by mass of the total cementations The total cementations content used (350 kg/m3 ,400 kg/m3 ,450 kg/m3, 500 kg/m3 and 550 kg/m3) was composed by 0,10,20,30,40,50,60 percentage of fly ash by mass of the total cementations material. material.

KEYWORDS: fly ash, Compressive, Split Tensile, Flexural, Dynamic Modulus of Elasticity

I.INTRODUCTION

For a variety of reasons, the concrete construction industry is not sustainable. Firstly, it consumes the huge amounts of pure materials. Second, the main binders in Concrete are Portland cement, whose production is an important contribution to the greenhouse Gas emissions that are involved in global warming and climate change. Thirdly, many concrete structures suffer from lack of durability, which has a disadvantageous impact on the resource productivity of the industry. Because the high-volume fly ash Concrete system addresses all three sustainability issues, its adoption will allow the Concrete industry is becoming more sustainable. The main aspects of concrete the performance that will be improved by the use of fly ash is greater in the long term and reduced permeability of concrete, resulting in longer concrete durability. The use of fly ash in concrete may also address some specific durability problems, such as sulfate Attack and reaction of alkaline silica. Fly ash particles are generally spherical in shape.

ADVANTAGES OF FLY ASH

a) Ultimate strength

b) Improved workability

c) Reduction of bleeding

d) Reduced heat of hydration

e) Reduced permeability

f)Increased resistance to sulfate attack etc..

SCOPE OF THE PRESENT STUDY

The present study aims to developing a concrete by replacement of ordinary Portland cement with 0% to 60% fly ash by mass, Cost efficient, Reduces CO2 produce and eco-friendly with environment, to find alternative solutions for concrete, to suggest fly ash as good construction materials by replacement of cement.

OBJECTIVE OF THE ATUDY

1) To study the strength in compression, tension, bending and shearing of HVFC in the short and long term.
2) Study the properties of fresh and hardened high volume fly ash with 0%, 10%, 20%, 30%, 40%, 50%, 60% replacement of cement and ordinary Portland cement.
3) Study the durability of HVFC in the short and long term
4) Study the permeability of HVFC in the short and long term.
5) Study the flow behavior of HVFC
6) Study the dynamic modulus of elasticity by using ultra sonic pulse velocity.
7) Studying the static modulus of elasticity of concrete by using the dynamic modulus of elasticity by the relations.

CASTING OF CUBES, CYLINDERS AND BEAMS.

Cubes, Cylinders And Beams specimens were Tested and casted for calculating 3 days, 7 days, 28 days,56 days, 90 days,180 days.

Fig .Tested Beams

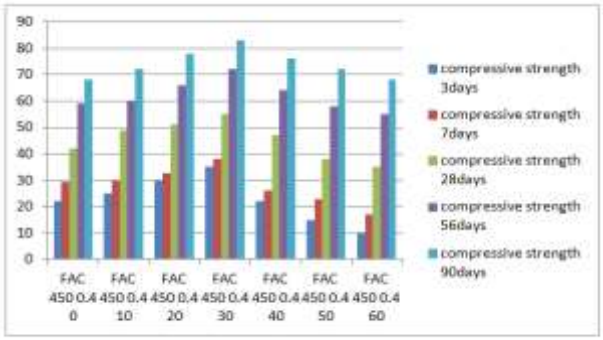
RESULTS

In this chapter the results are tabulated by calculating Fresh and Hardened properties of concrete. The research work is carried out on 450kg/ m^3 cementitious material with constant water cement ratio and partial replacements of cement by Fly Ash with different percentages (i.e.,0%,10%,20%,30%,40%, 50%, 60%).Compressive strengths for different proportions were tested by considering the replacement of cement separately.

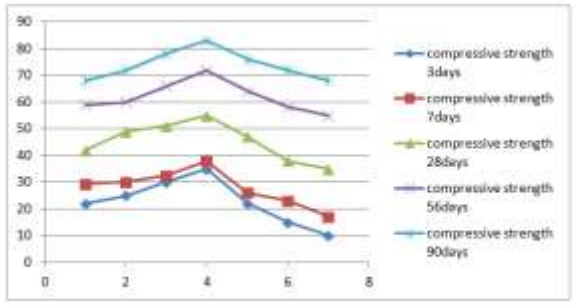
The proportions at which higher compressive strength in replacement of cement by fly ash considered. Properties like compressive strength, split tensile strength, flexural strength, workability and durability for M80 grade concrete at 7days and 28days are studied.

mix designation		Compressive strength N/mm^2				
		3 days	7 days	28 days	56 days	90 days
FAC 450 0.4	0	22	29.3	42	59	68
FAC 450 0.4	10	25	30	49	60	72
FAC 450 0.4	20	30	32.5	51	66	78
FAC 450 0.4	30	35	38	55	72	83
FAC 450 0.4	40	22	26	47	64	76
FAC 450 0.4	50	15	23	38	58	72
FAC 450 0.4	60	10	17	35	55	68

6.3.1Compressive strength Cement by fly ash for 450kg/m^3 and w/c ratio of 0.40



X- Axis mix designation Y- Axis compressive strength (N/mm^2)



X- Axis mix designation Y- Axis compressive strength (N/mm²)

CONCLUSIONS

Compressive strength increases up to 30% replacement of fly ash beyond this limit decreases gradually.

1) The early age strength i.e. for 3 & 7days, conventional concrete shows better results than fly ash mixed concrete. After 28 days fly ash mixed concrete shows impressive results.

2) As the time increases i.e. after 90 days there is a considerable change in compressive strength of the samples with fly ash more than 40% as their compressive strength is greater or equal to conventional concrete.

As the fly ash content increase the weight loss also increases

1) As fly ash content increases slump of concrete increasing due to higher workability nature of fly ash than cement.

2) A linear variation or increase can be seen in case of flexural strength of the concrete

3) Split tensile strength of the concrete increases upto 30% of replacement fly ash beyond this limit gradually decreases

4) Dynamic modulus of elasticity of the concrete decreases with increase in fly ash content.

5) Due to the presence of fine particles flyash offers more resistance to chloride ion penetration. Due to the above said effect, chloride ion penetration decreases with an increase in fly ash content.

6) Concretes with high volume of fly ash offers more resistance to sulphate attack due to presence of alumina in fly ash.

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