Comparison Of High Volume Strength And Durability Parameters Common Concrete And Fly Ash Concrete

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Abstract

The possibility of producing concrete with a low Portland cement content and improved or even high performances using local by-products like fly ash and common low-cost aggregates that have not been treated previously—that is, as received—was the focus of an experimental research project. The mechanical, workability, and durability characteristics of six distinct concrete compositions that contained significant amounts of fly ash were described. The proportion of fly ash by mass of the total cementations including 350 kg/m3, 400 kg/m3, 450 kg/m3, 500 kg/m3, and 550 kg/m3 was 0, 10, 20, 30, 40, 50, and 60%. Fly ash made up 0, 10, 20, 30, 40, 50, and 60% of the mass of the total cementation material used to create the 350 kg/m3, 400 kg/m3, 450 kg/m3, 500 kg/m3, and 550 kg/m3 cementations content. material.

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

I.INTRODUCTION

The concrete construction industry is not sustainable for a number of reasons. First of all, it uses up enormous quantities of pure resources. Second, Portland cement, which is used as a major binder in concrete, contributes significantly to greenhouse gas emissions that cause climate change and global warming. Thirdly, a lot of concrete structures are not very durable, which negatively affects the industry's resource productivity. Adoption of the high-volume fly ash concrete technology will enable the concrete industry to become more sustainable since it tackles all three sustainability challenges. The primary benefits of using fly ash in concrete are increased long-term performance and decreased permeability, which extends the concrete's durability. Certain durability issues, such sulfate attack and alkaline silica reactivity, may also be resolved by adding fly ash to concrete. The majority of fly ash particles have a spherical form.

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

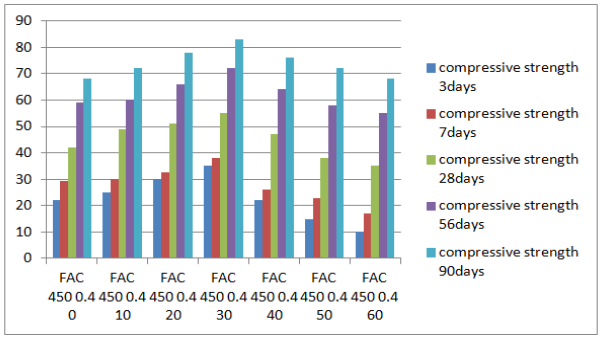
RESULTS

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.

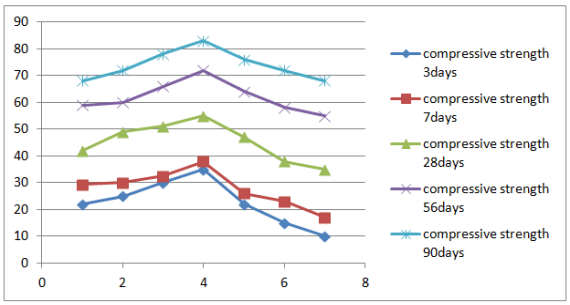
The proportions at which higher compressive strength in replacement of cement by fly ash considered. Properties like compressive strength, split tensile strength, flexural strength, workability and durability for M80 grade concrete at 7days and 28days are studied.

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/mm^2)

CONCLUSIONS

Up to 30% replacement of fly ash boosts compressive strength; after this, it steadily declines. 1) Conventional concrete outperforms fly ash mixed concrete in terms of early age strength, or for three and seven days. Concrete combined with fly ash has remarkable results after 28 days. 2) The compressive strength of the samples containing fly ash changes significantly over time, i.e., after 90 days, when it is larger than or equivalent to that of ordinary concrete. Weight loss increases in tandem with an increase in fly ash content. 1) Because fly ash is more workable than cement, concrete slumps more as fly ash content rises. 2) The concrete's flexural strength exhibits a linear fluctuation or rise. 3) Up to 30% of replacement fly ash boosts the concrete's split tensile strength; after that, it progressively declines. 4) As the amount of fly ash in the concrete increases, its dynamic modulus of elasticity drops. 5) Flyash provides greater resistance to chloride ion penetration because of its fine particle content. As fly ash content rises, chloride ion penetration falls as a result of the aforementioned action. 6) Because fly ash contains alumina, concretes with a high fly ash volume are more resistant to sulphate attack.

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