

A REVIEW ON EFFECT OF PARTIAL REPLACEMENT OF CEMENT BY FLY ASH IN CONCRETE

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Abstract - It is already been known realizations that the raw materials used in cement are limited and also non-renewable. So it is been need to be conserved for future generations. With this goal of attaining sustainable construction and a strong trend favouring the increased use of admixtures in concrete is emerging throughout the world. The mineral admixtures are basically the waste products of industrial processes, produced to the tune of millions of tonnes whose disposal is a great concern. Fly ash from coal based power plants is one such waste which is abundantly available in the different parts of India.

Keywords: Fly ash, Ordinary Portland cement (OPC), Partial replacement, pozzolona, compressive strength.

1. INTRODUCTION

The advancement of concrete technology can reduce the consumption of natural resources and energy sources and lessen the burden of pollutants on environment. Presently large amounts of fly ash are generated in thermal industries with an important impact on environment and humans. In recent years, many researchers have established that the use of supplementary cementitious materials (SCMs) like fly ash (FA), blast furnace slag, silica fume, metakaolin(MK), and rice husk ash (RHA), hypo sludge etc. can, not only improve the various properties of concrete - both in its fresh and hardened states, but also can contribute to economy in construction costs.

2. Review of Literature

Abdullah Anwar et al their studies tell that Fly ash is rich in cementitious industrial wastes and has great potential to replace Portland cement. Their studies tell that 28 days compressive strength of Mix can be achieved with a replacement of 30% of fly ash with the cement. When the percentage of replacement is increased the water/ binder ratio gets reduced, thereby, increasing the compressive strength.

Vinit Kumar Singh et al their study tells that Fly ash can be added in concrete as partial replacement of up to 20% without compromising compressive strength of PPC concrete. Workability is decreased with increase in

replacement level. At 20% replacement level compressive strength is substantial decrease at all ages.

A.chandana jyothi & S. shameem banu they observed that the strengths for the combined mix increases gradually as the time of curing period increases.

Also they observed that the combined mix was almost equal to that of the conventional mix; therefore it is recommended that Fly Ash can be replaced.

A.H. L. Swaroop et al conducted durability studies on concrete with Fly Ash and GGBS with replacing 20% of cement by Fly Ash, concrete made by replacing 40% of cement by Fly Ash, concrete made by replacing 20% replacement of cement by GGBS (GAC1) and Concrete made by replacing 40% replacement of cement by GGBS (GAC2). The effect of 1% of H₂SO₄ and Sea Water on these concrete mixes are determined by immersing these cubes for 7days, 28days, 60days in above solutions and the respective changes in both compressive strength and weight reduction had observed and up to a major extent and concluded that concretes made by that Fly Ash and GGBS had good strength and durable properties comparison to conventional aggregate in severe Environment and they recommend that the use of fly ash between 20-40% replacement with cement for better results.

K. Uma Shankar & K. Suganya conducted Study for durability. Structural elements were replaced by Fly Ash Aggregates by taking five different cement Fly Ash proportions and they observed that the higher quantity of fly ash in making fly ash aggregate specimens recorded lower weight losses during the Acid Resistance Test.

C.Marthong and T.P.Agrawal studied about compressive strength, durability and shrinkage of concrete and their Test results shows that, inclusion of fly ash generally improves the concrete properties up to certain percentage of replacement in all grades of OPC.

Md. Moinul Islam and Md. Saiful Islam studied and test results show that strength increases with the increase level of fly ash up to an optimum value, beyond which, strength values start decreasing with further addition of fly ash. Among these, the optimum amount of cement replacement in mortar is about 40%, which provides 14% higher compressive strength and 8% higher tensile strength as compared to OPC mortar.

Samaresh Pan founded that replacements of cement by fly ash have resulted in considerable variation in the properties of fresh concrete. Incorporation of fly ash in concrete increased the cohesiveness of the mix, prevented segregation and resulted in reduced bleeding.

Fly ash concretes have been found to be amiable to compaction than the control mixes. Higher percentages of fly ash can cause a change in color of the mix.

Prof. Jayeshkumar Pitroda, et al studied and found that fly ash in concrete can save the coal & thermal industry disposal costs and produce a 'greener' concrete for construction. Also their research concludes that fly ash can be innovative supplementary cementitious Construction Material.

5. CONCLUSIONS

Following conclusions can be drawn:

- (1) Use of fly ash reduces the amount of cement content.
- (2) Fly ash provides satisfactory results and can be used.
- (3) Fly ash with replacement up to 40% is showing better results.
- (4) The optimum fly ash content is observed to be 40% of cement.
- (5) Construction work with fly ash concrete becomes environmentally safe and also economical.

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to my thesis supervisor, Assistant Professor **Mr. Abhishek Kumar** and my friend Prabhat Kumar for their valuable support.

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- (12) IS: 8112-1989 - 43 Grade Ordinary Portland Cement (Reaffirmed 2005)
- (13) IS: 1489 part-1 1991 - Portland Pozzolana Cement flyash based
- (14) IS: 1489 part-2 1991 - Portland Pozzolana Cement calcined clay based (Reaffirmed 2005)

BIOGRAPHIES



Mr. Rakesh Kumar was born in year 1993 in Varanasi city. He received his Bachelor of technology degree in civil engineering from Ambalika college of Engineering and Management, Lucknow 2014. He is right now pursuing his Master of Technology in structural Engineering (Babu Banarasi Das University) Lucknow.



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