

A Review on Effect of Silica fume and Fly Ash on Concrete by Some Partial Replacement of Cement and fine aggregate

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ABSTRACT: The aim of this study is to determine the performance of concrete by adding the fly ash and silica fume in concrete by the partial replacement of cement and fine aggregate by some percentage and this will be done by different percentage at the gap of some percent and what will be effect on basic properties of concrete as from the other research paper it is noted silica fume and fly ash both are added separately in concrete by some partial replacement so result will be tremendous so here in this study by considering or reading all the previous data from the research paper the new work should also be positive fly ash is the waste product of coal combustion product also known as the fuel ash and silica fume is also known as the micro silica fume is nonmetallic and non-hazardous material.

Key words: silica fume, fly ash, test on concrete.

INTRODUCTION:

Concrete is a mix of the cement sand and aggregate and water in proper extent due to the use of concrete from previous decades the infrastructure and construction work is improving day by day by the modern techniques and by the lot of research done on concrete nowadays lot of research is done on concrete some time cement is replaced some time sand is replaced and also aggregate is replaced all these things are not completely replaced by anything just some percentage is replaced by any material in US one of the temple is made up of fly ash that is in that cement is replaced by fly ash up to the 60% so this is the very good result and as well as good research on the replacement of cement by fly ash because manufacturing of cement in huge amount also affect the nature so research work on replacing these things is must because there are lot of other material that can be mix in concrete or replace fine aggregate and coarse aggregate so in this work here the fly ash or silica fume both are replaced with cement to achieve good result because both these materials behave like cement when added to cement so by adding these the better strength is achieved both silica fume as well as are minx in concrete to improve its property the main benefits of adding silica fume it reduce the thermal cracking in concrete which cause by the cement hydration and fly ash is also SCM (supplementary cementitious material).

Material and Methodology:

The fly ash and the silica fume both are mixed in terms of the comparison of their property with the simple casted concrete in terms of their property and the basic test which are done on concrete. It will be added in concrete by the replacement of cement and fine aggregate different percentage . It will be added in replacement of cement and fine aggregate. The fly ash and silica fume will be placed with same percentage if we have to mix 10 percent both then 5 percent silica fume and 5 percent fly ash will be replaced and the optimum percentage should be noted. That at which percentage we achieve the better result. The cubes will be casted for 7 days or 28 days and result will be noted. So main thing is enhance the property and reduce the amount of cement and fine aggregate in concrete.

Result and Discussion:

The result is obtain by the different researcher which have done research work on fly ash and silica fume individually

S NO.	Author/Reference	Methodology	Result
1	Bhanja And Sengupta et.al(2005)	Obtained in the range of 15% to 25% silica fume replacement	Silica fume incorporation in concrete results in significant improvements in the flexural strength of concrete, along with the compressive strength.

2	Duval and Kadri et.al (1998)	Silica fume content up to 20% and reaches a maximum for a 10 to 15% silica fume level.	Found that the compressive strength of concrete increases.
3	Mazloom, et.al (2004)	found that the compressive strength development of concrete mixtures containing silica fume was negligible after the age of 90 days;	There were strength increases in the control concrete even after one year and the reason behind this can be attributed to the rapid formation of a layer which prevents reaction of silica fume with calcium hydroxide beyond 90 days.
4	Perumal & Sundararajan et.al (2004)	observe the Effect of partial replacement of cement with silica fume	The results also show that the SF concretes possess superior durability properties
5	Chatterjee, et.al (2011)	One may achieve up to 70% replacement of cement with fly ash when high strength cement and very high reactive fly ash is used along with the sulphonated naphthalene formaldehyde superplasticizer	He reported improvement in fly ash property could be achieved by grinding and getting particles in submicrocrystalline range.
6	Poon, Lam & Wong,et.al (1999)	Concluded that replacement of cement by 15% to 25% by fly ash results	Rresults in lower porosity of concrete and plain cement mortars.
7	Namagg & Ataderoet.al, (2009)	Used fly ash for partial replacement of cement and fine aggregates.	0% to 50% was tested in their study.

CONCLUSION:

From the research studies of fly ash concrete and the research study of silica fume concrete conclude that:

- Conclude that the use of both SF and FA will be overall beneficial
- By the use of these there will be decrease in amount of cement and fine aggregate
- The initial property of concrete like bleeding , segregation and slump will improved
- There will be increase in the strength of concrete that is high strength performance concrete is formed.
- The use of both fly ash and silica fume in concrete will overall enhance all the property of concrete and high strength concrete is achieved with the partial replacement of silica fume and fly ash.

SCOPE IN FUTURE:

By the use of SF and FA the better strength will be achieved which will result in less amount of cement is use and long time work on this can prove more than 50% of cement can be replaced by doing the certain change which show how to use waste of coal power plant waste in huge amount.

REFERENCES:

- [1] Bhanumathidas N and Kalidas, N, (2002) 'Fly Ash for Sustainable Development', Institute for Solid Waste Research.
- [2] Mohammad Iqbal Khan and RafatSiddique (2011), "Utilization of silica fume in concrete: Review of durability.
- [3] S. Bhanja, B. Sengupta (2002), "Investigations on the compressive strength of silica fume concrete using statistical methods".
- [4]Duval, R. and Kadri, E.H. (1998) 'Influence of silica fume on the workability and the compressive strength of high-performance concretes',
- [5]IS: 1489 part-1 1991 - Portland Pozzolana Cement fly ash based
- [6] Fly ash in concrete (Properties and Performance) - Report of Technical Committee.