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EFFECT OF REPLACEMENT OF FINE AGGREGATES WITH FLY ASH FINE AGGREGATES ON COMPRESSIVE STRENGTH OF M_{30} GRADE CONCRETE

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Abstract - *The research in relation to the use of sintered flyash to produce structural lightweight concrete, because of economic condition and also due to scarcity of natural aggregates. By seeing this context fly ash can be much more effective material used as replacement in concrete as fine aggregate along with cement combination is summarized in this paper. As discussed above , fine aggregates are prepared by using fly ash with small portion of cement using Pelletisation technique with varying proportions like 85:15, 90:10 and 95:05 of fly ash: cement respectively. Thus in the present study , the effect of flyash fine aggregate proportions on the compressive strength of the concrete in which the fine aggregates are replaced by a percentages of 25% and 50% by flyash fine aggregates with a different proportions are checked and the results are compared with a M_{30} grade conventional concrete results. 150mm X 150mm X 150mm blocks were casted for all FAFA proportions and cured for 28 days and compressive strength of all proportions of FAFA concrete are calculated .The compressive strength of 85:15 proportion FAFA concrete was found to be high when compared to other FAFA proportions such as 90:10 and 95:05 and it was equal to 28 days compressive strength of M_{30} grade concrete in all the replaced percentages.*

***Key Words*: Fly ash, FAFA- fly ash fine aggregates, compressive strength.**

1. INTRODUCTION

In the present study, fly ash is used in the production of fine aggregate. As flyash is a waste material and also the outcome of it is very huge in thermal power plant, part of flyash obtained is used in cement industries and remaining of it is simply land filled or dumped. As it contains silica content, it can be effectively consumed in the preparation of aggregates along with a binder solution like water. In this study fly ash is mixed with sufficient quantity of water in the preparation of flyash fine aggregate.

1.1 Compression Test:

For the test, the moulds of 0.15x0.15x0.15m is prepared. Mix of FA sand, CA, sand, binder and water are weighed and mixed thoroughly in the mixer and plasticizer of sufficient amount is added for the slum and ease of handling. After the process of mixing, the mixture is added to the oiled or greased cubical moulds in layers tamping the each layer. Then the cubical moulds concreted is allowed for drying for 24h and the oiled moulds are demoulded and are placed or immersed in water completely for the purpose of curing. The cured specimens of different ages are taken and are tested for strength due to compression. Here load is applied uniformly and the load the specimen takes ultimately is noted and strength aspect is determined using the formulae,

Compressive Strength= P/A Mpa

Where:

P= Load in kilo newton

A= Area of cubical mould

2. RESULS AND DISCUSSIONS

Table 1 Compressive Strength Results for 25% Replacement of Sand

Aggregates	Compressive Strength (MPa)			
	7days	14days	28days	56days
15:85	27.2	32.96	39.83	46.54
10:90	25.31	28.54	34.63	43.61
05:95	23.21	25.42	28.93	34.16
CC	28	33.6	42	48

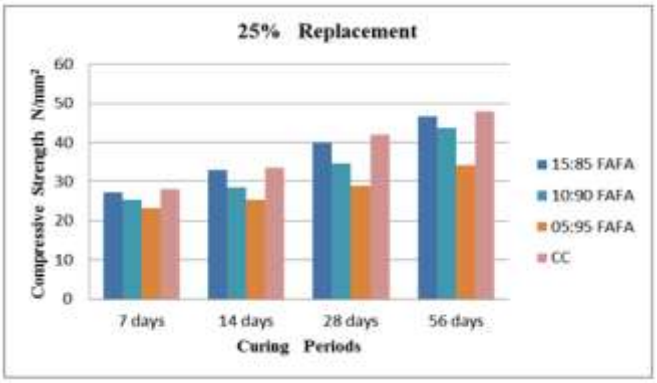

Fig 1 Bar Graph Showing Compressive Strength with 25% Replacement

Table 2: Compressive Strength Results for 50%Replacement of Sand

Aggregates	Compressive Strength (MPa)			
	7days	14days	28days	56days
15:85	25.86	31.43	37.96	44.39
10:90	23.72	26.84	32.21	38.42
05:95	22.14	23.61	25.43	32.17
CC	28	33.6	42	48

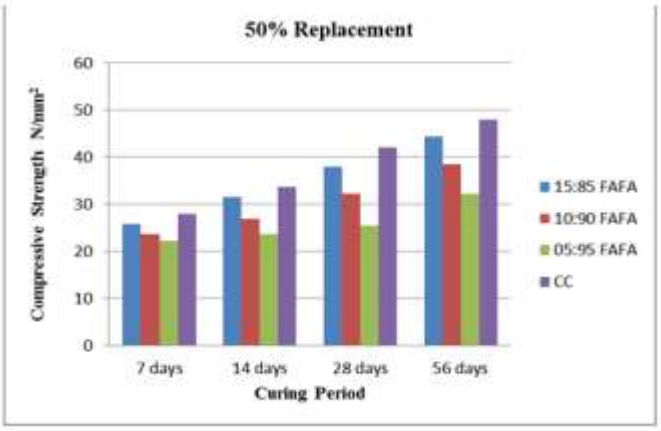

Fig 2 Bar Graph Showing Compressive Strength with 50% Replacement

The conventional concretes compressive strength for M30 grade shows 48 N/mm²but as the 85:15 proportion aggregates are replaced by 25%, and 50%the strength slightly varies. But when 85:15 proportion aggregates are compared with the aggregates of proportion 90:10 and 95:05 the strength is high.

Compressive strength of 85:15 aggregates are comparable with normal concrete hence this proportion aggregates are well suited and is optimum.

3. CONCLUSIONS

- Various mix proportions of fly ash aggregates were manufactured in the ratio of 95:5, 90: 10 and 85: 15 respectively and were blended with concrete M30 grade to study the compressive strength behavior of fly ash aggregate addition. Results showed that for 85:15 mix proportions with 25% and 50% replacement of natural aggregate showed compressive strength of 39.53 Mpa and 37.96 Mpa respectively.

- Based on the above experimental results it can be concluded that mix proportions of 85: 15 which shows higher compressive strength of 39.53 Mpa for 28 days is optimum, hence this proportion can be effectively used in civil engineering applications.

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