International Journal For Technological Research In Engineering
Volume 4, Issue 9, May-2017 *ISSN (Online): 2347 - 4718*

AN EXPERIMENTAL INVESTIGATION OF INCORPORATION OF FLY ASH WITH CONCRETE

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ABSTRACT: As we know in this developing era. Construction industry is developing fast. Many new things gain popularity in the field of construction industry. The addition of mineral admixture improves the properties of concrete like Compressive strength, Split tensile strength and Flexural strength. In this present experimental investigation Fly ash was used to replace the cement releases large amount of carbon dioxide into atmosphere thus pollutes our green environment in order to save this green environment from global warming we have to reduce the carbon dioxide emission. The objective of present investigation is that improve the quality of concrete by the addition of Fly ash like Compressive strength, Split tensile strength and Flexural strength and these Properties are studied of various replacements with cement 5%, 10%, 15%and 20%

Keyword: Fly ash, Mineral Admixture, Split tensile strength.

I. INTRODUCTION

Concrete is the mixture of cement aggregates (Fine and Coarse aggregate) water with or without an admixture results into hard mass concrete is widely used into the construction industry. No other material has not still exist which completely replaces the cement as we know the production of iron of Ordinary Portland cement releases equal amount of carbon dioxide and needs one ton of limestone etc. Thus causing problems to the green environment. The Fly ash is the by product from the combustion of coal in the thermal power stations. Fly ashes are generated in large quantity in these thermal stations. If this Fly ash is not properly management and directly disposed off in landfills, ponds, river and streams etc also pollutes the environment thus if we utilize it in the construction industry it increases the properties of concrete and reduces the pollution level.

II. LITERATURE REVIEW

Various experimental works has been done on the fly ash. And different authors came off with different conclusions some of the author who worked on the fly ash and their conclusion given below G.yamini ,P.SBanupriyaand etal [1]The authors studied that the mechanical properties of concrete increases. They also concluded that the split tensile strength test on cylinders should that 20% AFA replacement gives better strength when compared to CM and FA concrete.R.OPadhye and N.S Dea [2]The authors concluded that the concrete mixes decreases with increase in Fly ash. The Fly ash replaced 40% they also concluded that the addition of fly ash in concrete increases the strength. Chatterjee (200) [3]The author concluded that 50%of fly ash generated can be utilized he also concluded that we can replace 70% of cement with fly ash when we used fly ash with sulphanated naphthalene formaldehyde super plastics. Malthora [4]The authors that there are different ways by which we reduce carbon dioxide emission. He also concluded that manufacturing of cement generates huge amount of carbon dioxide we can replace the cement quantity by fly ash so in this way carbon dioxide emission to the environment can be reduced. Hwang, Noguthi and Tomosawa [5]The authors concluded that the addition of fly ash replaces the sand and the authors also concluded that the compressive is increases

III. EXPERIMENTAL WORK

1 MATERIALS REQUIRED

Following Materials were used in this experimental work.

2. CEMENT

A 43 grade of Ordinary Portland Cement was used in this Experimental work.

As per IS Code 4031 and IS 269-1967 are given in table.

Table 1: Properties of cement

S.NO	TEST	RESULT
1	Fineness of cement	97.75
2	Initial setting time	35m
3	Final setting time	57m
4	Specific gravity of cement	3.15

3. FINE AGGREGATE

The locally available sand passing through 4.75mm sieve used and the properties as per IS Code 2386-1968 are given in below.

4.COARSE AGGREGATE

Coarse aggregate was taken from quarry and the size of aggregates was taken 20mm. The test was carried on coarse aggregate as per IS Code 2386-1968 and the results are given below.

Table 3: Properties of coarse aggregate

S.NO	TEST	RESULT
1	Bulk density	845kg/m3
2	Specific gravity	2.81
3	Fineness modulus	6.4

5.FLY ASH

The Fly ash which was used in this experimental work was 2.91. The chemical properties of Fly ash are given in below

Table 4: Chemical Properties of fly ash

Chemical properties of minimum % by mass	IS code 3812-1981	Fly ash sample
SIO2+AL2O3+FE2O3	70	85
SIO2	35	56
CAO	5	4
SO3	2.75	1.9
NA2O	1.5	2.1
LOI	12	4
MGO	5	1

6.WATER

The water which was used in this experimental work was free from salts and other impurities. Usually Tap water is used for the mixing of concrete as per IS Code 456-2000

IV. RESULTS AND DISCUSSION

The compressive, split tensile and flexural strength was conducted on the specimen.

4.1 COMPRESSIVE SRTENGTH

The compressive strength is determined at 7days and 28days. In this experimental work the cubes are tested with replacements of 5%, 10%, 15% and 20% of the mass of cement with fly ash. The result of compressive strength is given below.

Table 5: Compressive strength

Replacement	7days	28days
MX0	15.03	28.43
MX5	18.73	31.85
MX10	19.55	32.21
MX15	21.99	33.99
MX20	19.47	30.07

4.2 SPLIT TENSILE STRENGTH

The split tensile strength was conducted on the specimen after 7days and 28days with the specimens prepared with fly ash replacing cement 5%, 10%, 15% and 20% of mass of cement with fly ash. The cylindrical mould used of size 150mm x300mm for split tensile strength test.

The result of split tensile strength is given below.

Table 6: Split tensile strength

Replacement	7days	28days
MX0	1.38	3.01
MX5	1.62	3.6
MX10	1.8	3.81
MX15	1.90	4.47
MX20	1.73	3.76

4.3 FLEXURAL STRENGTH

The flexural strength of concrete was tested on the specimen with the replacement of cement 5%, 10%, 15% and 20% with fly ash. The mould of size 100mmx100mmx500mm was used. The result of flexural strength is given below.

Table 7: Flexural strength

Replacement	7days	28days
MX0	1.26	2.34
MX5	1.42	2.89
MX10	1.71	3.22
MX15	2.09	4.04
MX20	1.8	3.17

V. CONCLUSION

From the results .the conclusion are as follows

- The experimental work that the properties of M30 concrete incorporation with fly ash
- The experimental work showed that the compressive strength increases upto 10%
- Flexural strength and split tensile strength increases upto 15% & 20% respectively
- The experimental work showed that the maximum strength gains the concrete at the dosage of 15%

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