International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 7, Issue 2, February 2018 **ISSN 2319 - 4847**

EFFECT OF ALCCOFINE ON FLYASH CONCRETE BLOCKS

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Abstract

Construction cost is increasing rapidly due to materials used for it and it can be reduced by using cost effective materials. Many experiments are done to obtain cost effective concrete with good strength and good quality. The study of cost effective concrete by using industrial waste product Fly ash. Fly ash is used as cement replacement. In this cement concrete of M40 grade design is carried out as per is codes .The tests are carried out to obtain maximum strength of concrete so cement is replaced by fly ash of various percentages like 10%,20%,30%,40%,50%,60% and 70% by adding water cement ratio of 0.35 and hyper plasticizer is used to reduce the water cement ratio to increase workability. Cubes were casted of size 150mm×150mm and total 84 number of cubes were casted for different curing periods of 7, 14, 28 and 56 days. After curing cubes are tested for 7, 14, 28 and 56 days by using compressive testing machine respectively. For 28 days of curing period, the maximum compressive strength is obtained for 20% cement replacement by fly ash gives good strength and for these to gain early strength alccofine is added as additive material of 3%, 6%, 9% and 12% for 28 days curing period. In these 12% alccofine is added and 50% cement replacement by Fly Ash gives better compressive strength. Test results shows that using fly ash can used as cost effective and good quality of concrete, by using alkofines we can improve the early age strength.

Keywords: Fly Ash, Alccofine, Hyper plasticizers

1. INTRODUCTION

Developing of country depends on fulfilling the basic needs of the man like food, shelter and transportation. The Growth of country was made by construction of buildings, roads, bridges, tunnels, dams, channels...etc. Now a day the cost of the construction materials is increasing, these affect the economical growth of the country. The main goal of civil engineers is to reduce the cost and providing economical growth without changing quality and strength of the material. From several years so many experiments were conducted to reduce the cost of construction material.

Concrete is the primary material for all building constructions. The basic components of concrete are cement, coarse aggregates, sand and portable water. If necessary conditions admixtures are added. From several decades concrete is used as binding material for construction. It exhibits the good property of binding and gains good compressive strength but weak in tensile strength. Many researches are done by adding mineral admixtures decrease the cost of materials and increase in performance of concrete. In this study, Fly ash exhibits pozzlonic activity so Fly Ash is used as cement replacement material to increase the concrete performance.

1.1 INDUSTRIAL WASTE PRODUCTS

The waste materials obtained from industries called as industrial waste products. These waste products can be obtained in the form of slag or powder form. This material exhibits the pozzolonic activity by adding the suitable chemicals. There are various forms of industrial wastes are commonly used are as follows Glass powder, Ground Granulated Blast Furnace Slag (GGBS),Silica fume,Rice husk ash (RHA),Fly ash.

1.2 FLY ASH

Fly Ash the waste product produced in electric power plants. It is made of fine particles and exhibits pozzolonic activity. so it can be used as cement replacement material in concrete. In electric power plants fly ash is obtained in large amount it causes the major disposal problem and environmental problem. It is mainly depends on the amount of calcium present in Fly Ash, it is classified as low calcium Fly Ash called C Fly Ash and high calcium is called F Fly Ash, the main content of fly ash is CaO and $Ca(OH_2)$ which implies the pozzolanic property of cement.

2 . METHODOLOGY AND MATERIALS

2.1.1 Cement

Cement is having good binding property. Cement is finely powdered binding material, which acts as a binder. The type of cement used in this particular project is M43 grade Ordinary Portland Cement (OPC). The basic tests on cement were conducted in accordance with BIS 8112-1989.

2.1.2 Fine aggregate

Fine aggregate is obtained degradation of rocks. The fine aggregate is of size should be within the range lies in between 4.75mm to 75µ as per codes.

2.1.3 Coarse aggregates

Crushed stones of size 20mm or less are used as coarse aggregates and these coarse aggregates should be tested accordance with BIS 2386-1963

2.1.4 Fly ash

In this present study Fly Ash was taken from Bellary Thermal Power Plant. Fly ash is finer than 90 micron was used. The chemical composition of Fly Ash is shown in table

Table :1 Chemical Composition of Alccofine

Parameters	Results
Loss on Ignition	0.39%
Silica	93.61%
Ferric Oxide	2.91%
Alumina Oxide	0.002%
Calcium Oxide	0.83%

2.1.5 Alccofine

Alccofine is a product it contains on high glass it process in high reactivity. The raw materials are composed primary of low calcium silicates. The particle size range is from 0.1 to 0.17 microns, with an average particle size of 4 microns.

Table:2 Chemical Composition of Alccofine

Parameters	Results
Loss on Ignition	1.0%
Silica	33.62%
Ferric Oxide	0.45%
Alumina Oxide	26.3%
Calcium Oxide	31.82

Alccofine can also be used as a high range water reducer to improve compressive strength or as a super workability aid to improve flow. Alccofine is known to produce a high-strength concrete and is used in two different ways: as a cement replacement, in order to reduce the cement content and as an additive to improve concrete properties.

2.1.6 Hyper plasticizers

It is a high range water reducer or it is called as hyper plasticizer which lowers the water cement ratio and provides required workability thus effects the concrete as easily pump able. Hyper plasticizer should be added to concrete at least having slump of 25mm without adding any admixtures. It is formulated from synthetic polymers specially designed to impart the cohesiveness to the concrete mix for easy pumping and placing. It considerably improves the properties of fresh and hardened concrete. Add 70-80% water to the concrete based on Mix Design by weight. The correct quantity of Hyper-plasticizer should be measured with recommended dispenser and should be added to the concrete with

remaining mixing water. Allow to mix it for recommended mixing time. The addition of Hyper-plasticizer to dry mixes or cement is not recommended.

Table:3 Physical properties of Hyper plastizer

Parameter	Specification(As per IS 9103)	Results
Physical state	Reddish Brown Liquid	ReddishBrown Liquid
Chemical name of active ingredient	Polycarboxylate Polymers	Polycarboxylate Polymers
Relative density at 25^0 C	1.080 ± 0.02	1.080
Ph	Min. 6	7.02
Chloride ion Content(%)	Max 0.2	0.0075
Dry Material Content(%)	34 (+5%)	33.48

2.2 METHODOLOGY

In this investigation construction of cubes using cost effective concrete blocks replacing cement by Fly Ash.The concrete used for blocks is to M40 grade concrete. Casting the concrete cubes of dimension 150×150×150 mm of 84 numbers for curing periods 28days . Casting of cubes of size 150×150×150mm of alkofines as additive material of 3%, 6%, 9% and 12% to the cement replaced by Fly Ash concrete. Three cubes for each percentage of Fly Ash with alkofine added.

Figure 1: **Casting of cubes for Compressive strength**

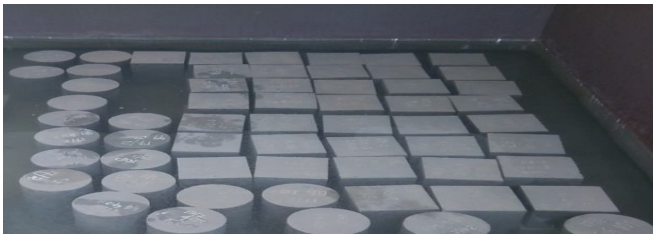

Figure 2: Curing of cubes

3 Test RESULTS

The tests are carried to obtain good strength and cost effective material. To find compressive strength for various percentages of fly ash in cement concrete. The maximum strength of fly ash concrete is obtained along with various percentages of fly ash with alccofine is calculated

Partial replacement of by fly ash with alccofines		
% Fly ash	**% of Alccofine**	**Comprssive strength**
40	3	81.1
	6	83.33
	9	78.44
	12	80.33
50	3	66.21
	6	81.1
	9	79.33
	12	87.55
60	3	62.66
	6	60.29
	9	63.85
	12	69.67
70	3	48.59
	6	55.4
	9	49.48
	12	57.92

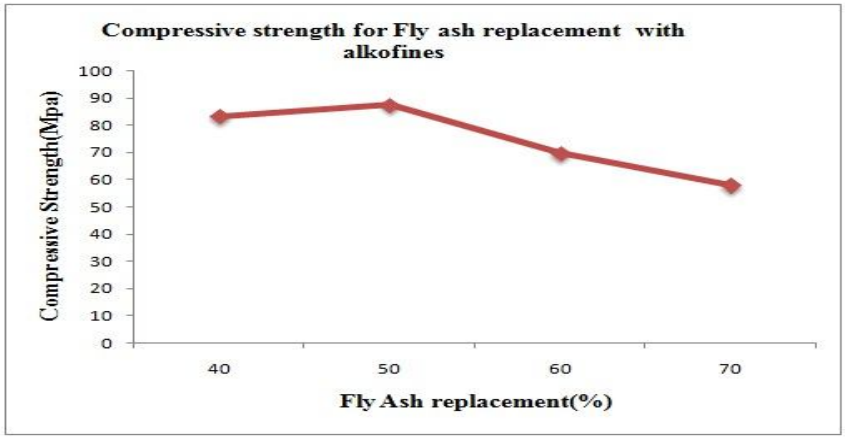

Figure -3: **Compressive Strength for 28 days**

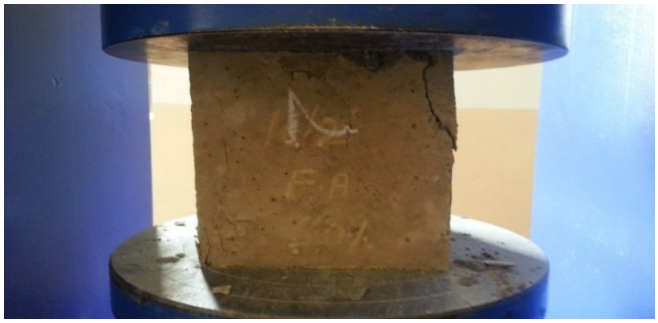

Figure -4: Compressive Strength for 28 days

4. CONCLUSIONS

- In conventional concrete cement is replaced by industrial byproduct fly ash for various replacement levels and exhibits more than required characteristic strength.
- The optimum strength by the use of fly ash in the concrete is observed to be at 20% replacement of cement.
- Optimum value occurs at 50% replacement of cement by fly ash with 12% of alccofines.

- The use of fly ash results cost effective and environment friendly concrete and reduces the usage of resources in the construction.
- Fly ash of very fine acts as excellent filler material and also involves in the heat of hydration.
- Using of fly ash decreases the disposal of waste hence decreases environmental pollution

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