International Journal of Engineering Research and Modern Education (IJERME)
ISSN (Online): 2455 - 4200
(www.rdmodernresearch.com) Volume I, Issue I, 2016

USED OF WASTE FLY ASH TO INCREASED COMPRESSIVE STRENGTH OF CEMENT

Rajat Lohar* & Amit Tiwari**

* B.Tech Scholar, Final Year (Mechanical Engineering), Shanti Suri College of Engineering, Udaipur, Rajasthan

** Assistant Professor, M.E Department, Shanti suri College of Engineering, Udaipur, Rajasthan

Abstract:

In this paper work we disused about utilization of waste Fly Ash from power plant. Mostly in boiler we used coal and wood to boiling water for high temperature for the purpose of generating steam after completely burning of fuel there are some wasted material occur such name as fly ash. Mostly worker in industries they have no idea to what is the used of fly ash and Disposal of fly ash requires large quantity of land, water and energy and its fine particles, if not disposed properly, by virtue of their weightless, can become air born and adversely affect the entire Environment. So in this paper to provide such kind of information of fly ash in cement industries how they used in cement to increased their compressive strength as well as more application of this fly ash we disused in the paper. These properties, therefore, makes it suitable for use in ceramic industries and helps in saving the environment and resources.

Key Words: Objective of Fly Ash, Purpose of Used and Its Applications.

1. Introduction:

Fly ash particles are almost totally spherical in shape, allowing them to flow and blend freely in mixtures. That capability is one of the properties making fly ash a desirable admixture for concrete. These materials greatly improve the durability of concrete through control of high thermal gradients, pore refinement, depletion of cement alkalis, resistance to chloride and sulphate penetration, and continued micro structural development through a long-term hydration and pozzolanic reaction. The utilization of by-products as the partial replacement of cement has important economical, environmental and technical benefits such as the reduced amount of waste materials, cleaner environment, reduced energy requirement, durable service performance during service life and cost effective structures. The use of the high volume fly ash cements improves the resistance of the concrete to the chloride ion penetration. The present study investigates the potential of fly ash as cement replacement in concrete. The objectives are to reduce the amount of ordinary Portland cement needed in building construction so as to achieve economic construction and sustainable development through the preservation of the environment. The process of coal combustion results in coal ash, 80% of which is very fine in nature and thus known as fly ash. The fly ash, solid waste from coal–fired thermal power plants, is becoming a serious concern to the environmentalists.

Figure: Fly Ash

2. Objective:

Properties of concrete depend upon properties of ingredients and their relative proportion. Addition of mineral in concrete mixes, while designing of mixes has become increasingly complex. This is due to the chemical composition and pozzolonic properties of admixtures. Above complexity will be experimentally studied in this research. The study will investigate the effect over the various properties of concrete with use of mineral admixtures. Based on above mechanism & combination the main objectives of this study are

1. To increase strength & durability of concrete by reducing water content & cement content.
2. Reduce disposal problem by using industrial waste as a concrete ingredient.

3. Classification of Fly Ash:

Fly ash is normally classified into two main categories *Class F and class C* on the basis of percentage of CaO and on the type of coal used for burning.

1. ***Class F***: Produced by Anthracite and bituminous coal
2. ***Class C*:** Produced by burning lignite or sub-bituminous coal.

4. How Fly Ash Is Hazardous:

Disposal of fly ash requires large quantity of land, water and energy and its fine particles, if not disposed properly, by virtue of their weightless, can become air born and adversely affect the entire Environment When it settles on leaves and crops in fields around the power plant, it lowers the yield. The fine particles of fly ash reach the pulmonary region of the lungs and remain there for long periods of time; they behave like cumulative poisons & cause many respiratory Problems.

5. Purpose of Used:

Present days construction industries needs faster development and also require high strength of concrete to facilitate the fast construction and economically construction. For that purpose we used high early strength of cement, to gain early strength of concrete. This demand of high early strength gain of concrete put forth the use of low w/c ratio. But when Use of fly ash in concrete imparts several environmental benefits and thus it is ecofriendly. It saves the cement requirement for the same strength thus saving of raw materials such as limestone, coal etc required for manufacture of cement. Fly ash is pozzolanic material & it improving the properties of concrete like compressive strength & Durability.

Figure: Mixture of Fly Ash with Cement

6. Some Important Properties of Fly Ash:

1. ***Ball bearing effect:*** The "ball-bearing" effect of fly ash particles creates a lubricating action when concrete is in its plastic state.
2. ***Spherical shape:*** It particles are almost spherical in shape, allowing them to flow and blend freely in mixture.
3. ***Decreased Permeability:*** Lo**n**g term pozzolanic action of fly ash, which ties up free lime, results in fewer bleed channels and decreases permeability.

4. ***Higher Strength****:* Over time fly ash continuously combines with free lime results increasing structural strength of mixer.
5. ***Reduced Shrinkage****:* Its lubricating action helps in decreasing dry Shrinkage.
6. ***Increased Durability****:* Its dense concrete helps keep aggressive compounds on the surface, where destructive action is lessened. Fly ash concrete is also more resistant to attack by mild acid, sulfate, water, and seawater.
7. ***Improved Finishing****:* Sharp, clear architectural definition is easier to achieve, with less worry about in-place integrity

7. Application of Fly Ash:

These earth elements primarily consist of silica, alumina & iron etc. and its physicochemical parameters are closely resembles with volcanic ash, natural soil and Portland cement etc. These properties, therefore, makes it suitable for use in ceramic industries and helps in saving the environment and Natural resources.

• ***Fly ash in bricks:***

Fly ash bricks have a number of advantages over the conventional burnt clay bricks. Unglazed tiles for use on footpaths can also be made from it. Awareness among the public is required and the Government has to provide special incentives for this purpose.

• ***Fly ash in manufacture of cement:***

Fly ash when mixed with lime and water forms a Cementious compound with properties very similar to that of Portland cement. Because of this similarity, fly ash can be used to replace a portion of cement in the concrete, providing some distinct quality advantages. The concrete is denser resulting in a tighter, smoother surface with less bleeding.

• ***Fly ash in distemper:***

Distemper manufactured with fly ash has similar properties like white cement & has been used in several buildings in Neyveli, Tamil Nadu etc. in India. The cost of production will only be 50% that of commercial distemper.

• ***Fly ash as fertilizer:***

Fly ash serves as a good fertilizer. It provides the uptake of vital nutrients/minerals (Ca, Mg, Fe, Zn, Mo, S and Se) to crops and vegetation, and can be considered as a potential growth improver.

8. Conclusion:

In India, about 120 coals based thermal power plants are producing nearly about 112 million tons of coal fly ash per annum. Indian thermal power plants generate both class F and class C fly ash and are disposed in ash ponds. Fly ash is a potential source of pollution not only for the atmosphere but also for the other components of the environment. Fly ash is now recognized as valuable substances which confers certain desirable characteristics in its many applications. Utilization of fly ash is already well established in various construction and waste solidification and stabilization processes. The fly ash utilization in cement we find out good compressive strength and due to this most of chemicals are saving in cement mixing there is lees used of zpsum in cement.

9. References:

1. Fly Ash for Cement Concrete, Ash Utilization Division NTPC Limited.
2. M. L. Gambhir, —Concrete technology||, Tata McGraw-Hill Education, 2004.
3. Fly Ash–Cast in Concrete, NAEB JOURNAL
4. Satya Vani Yadla, V. Sridevi and M.V.V.Chandana Lakshmi Journal of Chemical, Biological and Physical Sciences Vol.2.No.3, 1585-1593, May-July.2012,

5. Vimal Kumar, Mukesh Mathur, Shashank Shekhar Sinha, Sagar Dhatrak, FLY ASH: AN ENVIRONMENT SAVIOUR Fly Ash India, New Delhi (2005)
6. Donald Burden B.Sc. E., University of New Brunswick, 2003, The Durability of Concrete Containing High Levels of Fly Ash
7. N. Bouzoubaâ1, M. H. Zhang and V. M. Malhotra1 Mechanical Properties And Durability Of Concrete Made With High-Volume Fly Ash Blended Cements Using A Coarse Fly Ash.
8. BS EN197-1: 2000 Cement: part 1: composition, specifications and conformity criteria for common cements.
9. PRICE B,. CEM II Cements in the UK: the way forward?, Concrete, Vol 41, Number 2, pp 36-38, 2007
10. Aylesford newsprint- Our commitment. Safety, health and fire prevention report, 28 pp, 2006.