

# To Study the Economical and Environmental Benefits of Pond Ash: A Review

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## ABSTRACT

Over 130 million ton of Pond ash is produced in India for the production of Electricity in the thermal power plant.

In the above study we have shown that the pond ash can be used a substitute to the Sand And Cement in the Pond Ash modified cement mortar

Through this we conclude that Pond ash modified concrete has economical as well as Environmental benefits when used on a large scale it can be more effective and there is ample availability of Pond ash.

Thus we have done this study to prove that Pond Ash is a alternative to the filler material in concrete effectively

The amount of CO<sub>2</sub> is about one ton for production of one ton of cement. The main objective of using fly ash in high strength concrete is to reduce heat generation and to obtain better durability properties . Some cement manufacturing companies have started using fly ash in cement production during the last five years, but the overall percentage utilization is very small and most of the part of this thermal power plant waste is dumped at land hills or in ash pond dykes . The fly ash can be utilized in cement concrete and mortar as an ingredient or partial replacement of cement and sand. The replacement of Ordinary Portland Cement (OPC) may vary from 15 to 35 % or even higher percentage in mass concrete

## I. INTRODUCTION

It is expected that the increase of cement production would be 1.4 billion tones in 1995 to almost 2 billion tones in the year 2010. This results in the emission of about 2 billion tones of CO<sub>2</sub> in the environment per year [1]. The huge amount of pond ash accumulated around the thermal power stations is still posing threat to environment. The utilization of pond ash as a building material is one

of the possible way of its sustainable management. In the present study, an attempt is made to ascertain the possibility of using the pond ash as a replacement of sand in plaster mortar. Cement manufacturing process consumes about 7.36x10<sup>6</sup> KJ energy per one ton of cement .

## II. LITERATURE REVIEW

**Faaz Al-Ajmi, Hang Abdulla Jamal Al matawah:-**Earth has mud bricks it has been used in building construction for thousand of years mud bricks is an environmental friendly Building material. This research work is made because to check the strength and the behaviour of mud brick in building construction. So the mud bricks is used for energy efficient housing therefore mud bricks consist of clay water and binding material as rice husk and straw.

Though mud brick is considered as one of the oldest construction materials there are no correct design code to follow before construction the main aim is to study the effect of mud brick in gredicals on strength and absorption by this the specific objective of study are to improve mud brick consolidation by using the materials silicate, ethyl silicate ,silancs or siloxans . The effect of using metallicfibre to improve mud brick durability I investigated so this is the strength behaviour of mud bricks in building construction.

**MilindP.Bhamare ,YogeshN.Bafna , ArunK.Dwivedi:-** A thermal plant converts the energy rich fuel into electricity and heat coal produces electricity and takes about 80% to 85% of the total power generated in India in the coal based power plant generate a very huge amount of ash the generated ash contains 20% pond Ash and 80% fly ash of all the Ash generated. Fly ash is recycled as an change to the cement which the pond Ash is disposed. pond Ash require huge amount of area, water and energy to get disposed so as the pond

Ash requires huge amount of the requirement to get dispose so this is used an alternative for cement.

So the compressive strength of the cement decreases with increase in the amount of the pond Ash the increasing amount of the pond Ash is responsible for the decrease of cement compressive strength. It is observed from the analysis of compressive strength results that as the pond ash percentage increases in the cement paste the compressive strength decreases due to low pozzolanic property of the pond ash.

**Prashant G. Sonawane, Dr. Arun Kumar Dwivedi:-**The fly ash is by product from coal fired power plant is disposed off in slurry form, form the power plants is ash dykes. And the pond ash is mixture of fly ash and bottom ash , the main part of pond ash is relatively coarse than the fly ash . this research work is made to find possibility of using pond ash in burnt clay bricks. The part of clay is replaced by pond ash with a different composition and form bricks in manufacturing plant. And study the characteristic of brick due to replacement of pond ash.

As the pond ash is waste product is form on power plant and the storage of that ash is needed larger area of land and resulting the land degradation near the thermal power plant. As the ash produced in larger amount its need to dispose it safely and found out the ways of utilizing it. If this ash dispose indirectly contact with environment it gives harmful impact on nature.pond ash particle size is lesser than fly ash so its become less pozzolonic as compared to fly ash.

The main aim of this work was to make changes in generation of mullite .and burning of brick with different temperature and thereafter test characteristics of brick. In the result fly ash shown good result in physical properties .the crushing strength becomes directly proportional to the the fly ash content in bricks.

**ArunkumarDwivedi, Dhiraj Kumar S. Lal:-**Cement production reaches the stage of 2 billion tone in 2010, that means 2 billion tones co2 harsh the environment. So utilization of pond ash is become the major important factor to the environment.so the fly ash can be utilized in cement or sand. So research work using fine and properly graded sand and not contain clay balls or pallets. Bottom ash collected from the boiler mixed with fly ash and convey from the slurry and deposited in pond. In research work using fine and properly graded sand. And not contain clay balls or pallets.

Fly ash converted into two parts part I – for use a pozolona in cement mortar and concrete. Part II – for use admixtures in cement mortar and

concrete. Three test were taken dry bulk density test , compressive strength test and flexural strength. Dry density for mortar as a part of a pond ash for the replacement sand is observed decreased by 2.24 % for 10% pond ash replacement. In the point of compressive strength decreased as the pond ash percentage increased. And for the flexural strength first increased in 5% and 10% as the pond ash replacement and further increased percentage replacement the flexural strength decreases.

**AdityaVerma,AbhishekKumar,Ashish Mishra,ArjitVerma:-** In India the power stations are mostly coal based which requires a huge amount of coal. so as the combustion of coal it produce a large amount of fly ash. It is the byproduct of thermal power station which requires a large area, suitable method for its disposal. Fly ash is collected by mechanical and electrostatic precipitators from the flue gases of power plant where; bottom ash is collected from the bottom of the boilers. And then these two types of ash, mixed together and are transported in the form of slurry and stored, the deposit is called pond ash. The total production of fly ash in India is over 100 million tones and the disposal is major problem. For the disposal of thermal power station adopts wet method for its disposal. In the wet method fly ash and bottom ash are mixed with water and disposed in open lands. Pond ash utilization helps to reuse the wastes from thermal power stations as well as to solve the problems of disposal of pond ash, so as it contains chemical compounds such as  $\text{SiO}_2$  . which has cementitious property to form bond between two adjacent particles.

After the combustion of coal the residues of ash is obtained for all thermal power plants. This study is to investigate the test result of concrete in which cement is replaced by pond ash. The fly ash obtained from power station need suitable method for its disposal. therefore the best suitable method which all the power plant uses is wet disposal method. The fly ash, bottom ash and water are mixed until slurry is obtained and then the slurry is disposed in open lands. After the drying of that slurry clinkers are formed that can be collected as pond ash. The pond ash has a cementitious property as well as act as fine aggregate in concrete. The variation in particle size of natural sand and pond ash are very low.

**Sang Hwa Jung and Seung-Jun Kwon:-** Due to thermal power generation from 1950, several countries including South Korea have been rapidly developed and coal still has been attractive as a source of power plant for its cost benefit, abundant deposits, and stable supply systems. However, CO<sub>2</sub> release from the power plant has

become social and engineering issue for GREEN HOUSE EFFECT. In Korea, reuse of FA went up to 67.9% in 2010 and showed 11% increase rate for the last 5 years. However BA shows only 40% of reuse for sub base material and more than 60% is treated for reclamation and landfill which is actually wasted. Since reuse of BA like reclamation or simple stack may cause additional soil contamination and insufficiency of natural resources like sand. In the previous research, the studies are performed for CCPs (Coal Combustion Products) but only the material of FA and BA are obtained and used from coal fired power plant. In the paper, domestic PA from reclamation and landfill sites is studied for a feasible replacement of sand in cement mortar. For evaluation of durability performance in hardened PA cement mortar, several tests like strength, freezing and thawing action, chloride migration, and accelerated carbonation are performed, and their results are compared with those from control cases (without PA mortar). The effect of water content on workability and performance of PA mortar is also evaluated. Evaluation and discussion of engineering properties in PA cement mortar are dealt with in this paper as a construction material.

### III. METHODOLOGY

This method is used for collection of data for the economical and environmental benefits of the pond ash. This questionnaire was prepared on objective of research. The questionnaire prepared by Faaz Al-Ajmi, Hang Abdulla Jamal Al matawah based on the behavior of masonry materials under uniaxial compression loading (1). The questionnaire prepared by Milind P. Bhamare, Yogesh N. Bafna, Arun K. Dwivedi based on the utilization of pond ash as cement replacement and properties of pond ash modified cement (2). The questionnaire prepared by Prashant G. Sonawane, Dr. Arun Kumar Dwivedi based on technical properties of pond ash (3). The questionnaire prepared by Arunkumar Dwivedi, Dhiraj Kumar S. Lal based on the investigation on the effect of addition of pond ash partially replaced with cement and sand in the mortar. The questionnaire prepared by Aditya Verma, Abhishek Kumar, Ashish Mishra, Arjit Verma based on the utilization of pond ash as partial replacement of cement concrete mix (5). The questionnaire prepared by Sang Hwa Jung and Seung-Jun Kwon based on Engineering properties of cement mortar with pond ash in south Korea as construction materials (6).

### IV. CONCLUSION

In the above study we have shown that the pond ash can be used a substitute to the Sand And Cement in the Pond Ash modified cement mortar. Through this we conclude that Pond ash modified concrete has economical as well as Environmental benefits when used on a large scale it can be more effective and there is ample availability of Pond ash. Thus we have done this study to prove that Pond Ash is a alternative to the filler material in concrete effectively

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