INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 3 ISSUE 3 (2017) PAGES 2500 – 2503
RECEIVED : 25.05.2017 PUBLISHED : 19.06.2017
June 19, 2017

UTILISATION OF POND ASH AS FINE AGGREGATE

[1]Dr.R.Madheswaran, [2]M.Bharath, [3]M.Anjali devi,
[1]HOD, Department Of Civil Engineering, Bharathidasan Engineering College, Nattrampalli,
[2]Asst. Professor, Department Of Civil Engineering, Bharathidasan Engineering College, Nattrampalli,
[3]PG Scholar, Dept Of Structural Engineering, Bharathidasan Engineering College, Nattrampalli.

Abstract

This paper presents a review on utilization of pond ash as partial replacement of cement concrete mix. These days coal based power plant are very popular, which generates large amount of fly ash, bottom ash and pond ash. The disposal of the fly ash is big challenge from environmental point of view. This study combines the work done in this area by various researchers and shows the effect of addition of pond ash on different properties of concrete.

Key Words: Fly ash, pond ash, bottom ash, compressive strength, flexural strength.

1. INTRODUCTION

In India the power stations are mostly coal based which requires a huge amount of coal. As the combustion of coal it produces a large amount of fly ash. Fly ash is the byproduct of thermal power station which requires a large area, suitable method for its disposal. Fly ash is collected by mechanical or electrostatic precipitators from the flue gases of power plant whereas; bottom ash is collected from the bottom of the boilers.

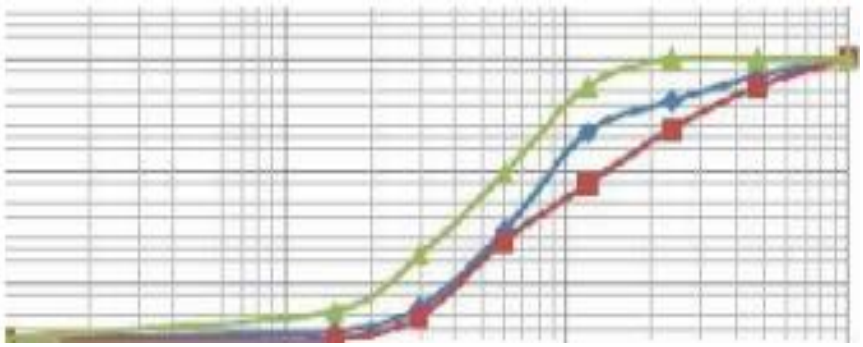

Fig.1. Particle size distribution on natural sand

When these two types of ash, mixed together, 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 its disposal thermal power station adopts wet method for its disposal. In 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, as it contains chemical compounds such as SiO2, Al2O3 etc. which has cementitious property to form bond between two adjacent particles.After the combustion of coal the residues of ash is obtained in 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. So 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.

2. RELATED WORK

Abdulhameed Umar Abubakar et.al. (2012) The fly ash and coal bottom ash samples were collected from the tanjung bin power plant from this study he concluded that for M35 grade concrete has got a compressive strength of 30N/mm2 for a curing period of 28 days. By increase in the curing period the strength of this particular concrete gets increased. S.A. Haldive et.al. (2013) studied the fly ash and pond ash are obtained as the by product from the thermal power plants and got to the conclusion that this replaced concrete will give higher compressive strength compared to the normal concrete with OPC of 53 grade. Abhishek Sachdeva et al. (2015) carried out experimental investigation to study the effect of use of coal bottom ash as a partial replacement of fine aggregates in concrete. An experimental program is planned in which controlled concrete of grade M40 is prepared. Fine aggregate is partially replaced with coal bottom ash by 10%, 20%, 30% and 40%. A marginal decrease was observed, in the compressive strength up to 20% replacement level. Therefore, 20% of fine aggregates may be replaced with coal bottom ash and a concrete with good strength may be produced with coal bottom ash in concrete.

Aparna K.A et. al (2015) performed partial replacement of cement and sand using fly ash and pond ash. The grade of concrete is M40, cube and beam specimens are casted and cured for 28 and 56 days. The 20%FA, 18%PA mix will give a high compressive strength of 47.52 N/mm2 for 56 days curing period. The 20%FA, 16%PA mix will give a low compressive strength of 33.77 N/mm2. The 20%FA, 18%PA mix will give 8% of higher strength compared to normal concrete. The 56 days cured concrete of 20%FA, 18%PA will give 6% higher strength compared to 28 days cured concrete mixes. Shekhar Mahat et. al (2015) carried experimental studies on the use of Pond ash as Fine Aggregate (FA) in concrete. The properties of Pond Ash were compared to the standard sand. The pond ash added by weight is 10%, 20%, 30%, 40%, 50% and 60% respectively as replacement of FA in concrete. The compressive strength of the concrete with 10% Pond ash replacement as Fine aggregate has higher strength for 3,7 and 28 days of curing but the strength is higher for 20% replacement for 56 days of curing.

3. ANALYSIS

Aparna K.A et. al (2015) performed partial replacement of cement and sand using fly ash and pond ash. The grade of concrete is M40, cube and beam specimens are casted and cured for 28 and 56 days. The 20%FA, 18%PA mix will give a high flexural strength of 11.16 N/mm2 for a curing period of 56 days. The 20%FA, 18%PA mix will give 25% higher strength compared to normal concrete. The 56 days cured concrete will give 10% higher strength compared to 28 days cured concrete of other mixes.) carried out experimental investigation to study the effect of use of coal bottom ash as a partial replacement of fine aggregates in concrete. Workability decreases with the increase in levels of sand replacement by coal bottom ash because bottom ash is more porous; therefore absorb more water than sand. Aparna K.A et. al (2015) performed partial replacement of cement and sand using fly ash and pond ash. The grade of concrete is M40, cube and beam specimens are casted and cured for 28 and 56 days. The 20%FA, 18%PA mix will give a high flexural strength of 11.16 N/mm2 for a curing period of 56 days. The 20%FA, 18%PA mix will give 25% higher strength compared to normal concrete. The 56 days cured concrete will give 10% higher strength compared to 28 days cured

concrete of other mixes. studied experimental investigation on the effect of addition of pond ash partially replaced with cement and sand in the mortar. For replacement up to 40% it is observed that the dry density decreases with increase in pond ash content in mortar. For series-II (cement replacement) the bulk densities for all replacement is gradually decreases with increased percentage of pond ash content.

Hence it was concluded that the bulk dry density reduces with increase in percentage replacement of pond ash when compared with OPC mortar. studied effects of coal bottom ash as fine aggregates in place of sand on properties of concrete. The natural sand was replaced with coal bottom ash by 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 100% by weight. The densities of hardened concrete linearly decreased as the replacement ratio of bottom ash was increased from 10% to 100% as compared to controlled concrete. investigate the effect of use of coal bottom ash as partial replacement of fine aggregates in various percentages (0–30%), on concrete properties. Splitting tensile strength of concrete improved on use of coal bottom ash as fine aggregate in partial replacement of sand and also when micro silica was added to the optimum mix.

CONCLUSION

The compressive strength for 7, 28, 56 and 90 days was increased up to 15-20% replacement and after that compressive strengths were decreased for further more replacement. A marginal decrease was observed in the flexural strength upto 15-20% replacement level. A decrease in strength of concrete with the increase in levels of fine aggregate replacement by coal bottom ash is due to the replacement of the stronger material with the weaker material. Splitting tensile strength of concrete improved on use pond ash as fine aggregate in partial replacement of sand. Workability of concrete decreases with the increase in percentage of Pond ash, as it is more porous, therefore absorb more water than sand hence some super plasticizer can be used in increasing dose as percentage of pond ash is increased. The densities of hardened concrete linearly decreased as the replacement ratio of ash was increased from 10% to 100% as compared to standard concrete.

REFERENCES

[1] Abdulhameed Umar Abubakar, "Properties of concrete using tanjung bin power plant coal bottom ash and fly ash," International Journal of Sustainable Construction Engineering & Technology (ISSN: 2180-3242) Vol 3, Issue 2, 2012.

[2] Abdulhameed Umar Abubakar, Khairul Salleh Baharudin “Properties of concrete using tanjung bin power plant coal bottom ash and fly ash” International Journal of Sustainable Construction Engineering & Technology (ISSN: 2180-3242) Vol 3, Issue 2, 2012.

[3] S.A.Haldive, "Experimental study on combined effect of flyash and pond ash on strength and durability of concrete", International journal of scientific and emgg. Research Vol 4, Issue 5, May 2013. [

4] Prof. P. P. Bhangale" Study of Pond ASH (BTPS) Use as A Fine Aggregate in Cement Concrete "-Case Study, International jornal of latest trends in Engg. And Technology, Vol 2, Issue 2, March 2013.

[5] Jay Patel, Kunal Patel, Gaurav Patel "Utilization of pond fly ash as a partial replacement in fine aggregate with using fine fly ash and alccofine in hsc" IJRET: International Journal of Research in Engineering and Technology 2013 eISSN: 2319-1163 | pISSN: 2321-7308

[6] Arunkumar Dwivedi, Dhiraj Kumar S. Lal "Influence of Addition of Pond Ash as Partial Replacement with Sand and Cement on the Properties of Mortar" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-4, March 2013.

[7] M.P.Kadam, DR.Y.D. Patil "Effect of coal bottom ash as sand replacement on the properties of concrete with different w/c ratio" International Journal of Advanced Technology in Civil Engineering, ISSN: 2231 –5721, Volume-2, Issue-1, 2013.

[8] Remya Raju, Mathews M. Paul & K. A. Aboobacker "Strength performance of concrete using bottom ash as fine aggregate" International Journal of Research in Engineering & Technology (IMPACT: IJRET) ISSN(E): 2321-8843; ISSN(P): 2347-4599 Vol. 2, Issue 9, Sep 2014, 111-122.

[9] Aparna K.A., Dr. V. Ramesh "Comparative Study of Fly Ash and Pond Ash on Compressive and Flexural Strength of Concrete" International Journal of Civil and Structural Engineering Research 2015 ISSN 2348-7607 Vol. 3, Issue 1, pp: (345-348).