International Journal of Innovative Research in Engineering Science and Technology

May 2017 *ISSN 2320 – 981X*

FEASABILITY STUDY ON PARTIAL REPLACEMENT OF CEMENT AND FINE AGGREGATE BY COCONUT SHELL AND DEMOLISHED CONCRETE WASTE

BRAGADEESWARAN T[1], KARVENDHAN A[2], ATTHIKUMARAN N[3] ,

[1] Assistant Professor, Nandha College of Technology, Erode

[2]Associate Professor, Nandha College of Technology, Erode

[3]Associate Professor, Nandha College of Technology, Erode

ABSTRACT

During the past few decades the potential of Portland cement in terms of its effective performance has been enhanced through the use of supplementary cementecious materials. As a result the use of new admixture has dramatically increased within the concrete industry. Availability of admixtures marked opening of a new era for designing concrete mix of higher and higher strength. Coconut shell ash, Demolished wasteand slurry water used as a waste material to improve the properties of concrete.

This present investigation mainly focused on the study of Coconut shell ash as partially replacement for cement,Demolished concrete as partially replacement for fine aggregate.Theoptimum replacement level 5% coconut shell ash and 5% demolished waste material can be replace for cement and fine aggregate its reduce the cost and materials improved our recycle system

.1.INTRODUCTION

GENERAL

Concrete is one of the most extensively used construction material in the world with two billion tons placed worldwide each year. During the past few decades the potential of

Portland cement in terms of its effective performances has been enhanced through the use of Supplementary Cementitious materials (SCM). Also, as environmental concerns, stemming from the high energy expanse and CO_2 emission associated with cement manufacture, have brought about pressure to reduce cement consumption through use of SCM. As a result, the use of new admixture has dramatically increased within the concrete industry. Sustainable development and cost reduction in building are the primary objectives in almost all the developing countries. To achieve this objective, there are intensive efforts being made in the effective utilization of wastes and by-product, particularly from mineral and mining industries. Utilizationof recycled waste materials in the building industry hasdeveloped in the last 10 years. Recycled waste materials are almost used for non-load bearing structures.

Nevertheless, large numbers of industries wastes can be utilized in the building industry and they can be fabricated in to products for load bearing structures.

So we are greatly in need of some alternative material to bring down this hike. At the same time such material should be eco-friendly and should harm the environment at any cast. Some of the waste materials that can be as a replacement for cement and coarse aggregate in concrete productions are pumice, perlite, expanded clay or vermiculite, coal slag, sintered fly ash, rice husk, straw, sawdust, cork granules, wheat husk, oil palm shell, and coconut shell.

The exponential growth rate of population, development of industry and technology, and the growth of social civilization would be considered as the underlying factors that have caused the increase in waste production. Recently, the importance of countermeasures to deal with waste materials has been pointed out, because such materials continue to increases in each and every year. The use of alternative

aggregate has become necessity for the construction industry because of the economic, environmental and technological benefits derived from their use. The high cost of conventional building materials is a major factor affecting housing delivery in India. In developing countries where abundant agricultural and industrial wastes are discharged, these wastes can be used as potential material or replacement material in the construction industry. This will have the double advantage of reduction in the cost of construction material and also as a means of disposal of wastes. It is at this time the above approach is logical, worthy and attributable.

Presently in India, about 960 million tone of solid wastes are being generated annually as by-products during industrial, mining, municipal, agricultural and other processes. Of this 350 million tones are organic wastes from agricultural sources; 290 million tones are inorganic waste of industrial and mining sectors. However, it is reported that about 600MT of wastes have been generated in India from agricultural sources alone

The major quantity of wastes generated from agricultural sources are sugarcane molasses, paddy, wheat straw husk, vegetables wastes, food products, tea,oil production, jute fiber, groundnut shell, wooden mill waste, coconut husk, cotton stalk etc. The new and alternative building construction materials developed using agro-industrial wastes have ample scope for introducing new building components that will reduce to an extent the costs of building materials. One such alternative is coconut shell which is a form of agricultural solid waste. It is one of the most promising agro wastes with its possible uses as binder in the production of concrete. A large number of concrete highway bridges, concrete dams, nuclear power plants and other offshore structures have beeb actively constructed in many countries. During the past several decades, concrete structures had structures had suffered for safety and serviceability problems due to deterioration of concrete. Generally concrete is a very durable material but the environmental factors such as weathering action, chemical attack, abrasion and other deterioration process may change the properties of concrete with time. High performance concrete provides a solution, and achieves a specified service life by enhancing the concrete characteristics such as volume stability, long term mechanical properties etc.

The premature deterioration of reinforced concrete structures is mainly due to the steel reinforced corrosion. The penetration of aggressive ions into concrete is the most important factor in the physical and chemical process of deterioration. The major aggressive ion causing severe reinforcement corrosion is the chloride ion. The penetrated chloride ion destroys the natural passivity of the surface of reinforcing steel and often leads to the corrosion of steel, cracking and spalling of concrete. The reinforcing steel can be protected by various methods such as cathodic protection, corrosion inhibitors, barrier coatings, better quality concrete and providing larger cover thickness.

2. MATERIALS

2.1 COCONUT SHELL ASH

Coconut shell broken randomly by hammer then burn 900 degree heat. The results of Specific gravity of the coconut shell ash special consideration while selecting the coarse aggregate for HSC. The aggregate should be sound, free from deleterious materials and must have crushing strength, at least 1.5 times that of concrete. Grading of aggregate plays crucial role in HSC and it becomes even more important if placement is by concrete pump. Flaky and elongated particles are to be restricted to a minimum to reduce the weaker zones in the concrete. This is important for tensile strength. Although Indian code does not specify any limit on flakiness and elongation indices, it is preferable to limit these indices individually to 15% and their combined value to 25% for good quality of concrete.As far as the shape of the aggregate is concerned, crushed granite coarse aggregate provides better interlocking and hence higher strength than rounded gravel aggregate. The coarse aggregate meeting the requirements of BIS: 383 - 1970 is suitable for making higher strength concrete.Considering all the above aspects, blue granite crushed stone aggregates of 12.5mm as maximum size and of typical particle shape “average and cubic” were used as the coarse aggregate for the present investigation. The aggregates were tested as per the procedure given in BIS: 2386 - 1963

Fig 1: Coconut Shell

Fig 2 :Coconut shell ash

2.2COARSE AGGREGATE

Hard granite broken stones of less than 12.5mm size were used as coarse aggregate.The coarse aggregate is the strongest and the least porous component of concrete. Presence of coarse aggregate reduces the drying shrinkage and other dimensional changes occurring because of moisture. Properties such as crushing strength, durability, modulus of elasticity, maximum size, gradation, shape and surface structure characteristic, percentage of deleterious particles as well as flakiness and elongation indices need .

2.3 CONCRETE DEMOLISHED WASTE

Demolished waste was collected from Building near work site, crush and sieved

Fig 3: Demolished Waste

may cause a marked reduction in strength of concrete either by combining with cement to reduce the bond or by causing large amount of air entertainment in concrete.

*2.6*MIX DESIGN *(M_{30} concrete)*

Water	*Cement*	*Fine aggregate*	*Coarse aggregate*
186.58	*387.45 kg/m^3*	*656.73 kg/m^3*	*1171.87 kg/m^3*

Chemical component	**% by weight**
Iron oxide (Fe_2O_3)	8.80
Aluminium Oxide	15.75
Silica (SiO_2)	59.50
Loss of Ignition (L.O.I)	0.53
Calcium Oxide (CaO)	3.68
Magnesium Oxide	1.25

0.48	*1*	*1.69*	*3.02*

The design mix ratio is adopted as 1: 1:69: 3.02

3. RESULTS &DISCUSSIONS

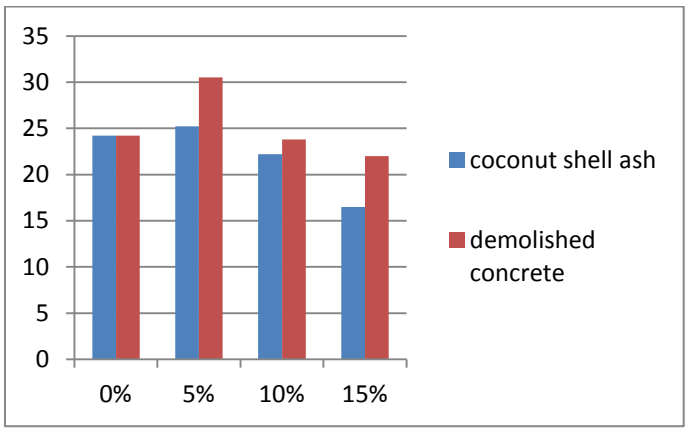

Figure 5: 7days compressive strength

Figure 6 shows the 28days compressive strength of coconut shell ash and demolished waste added concrete

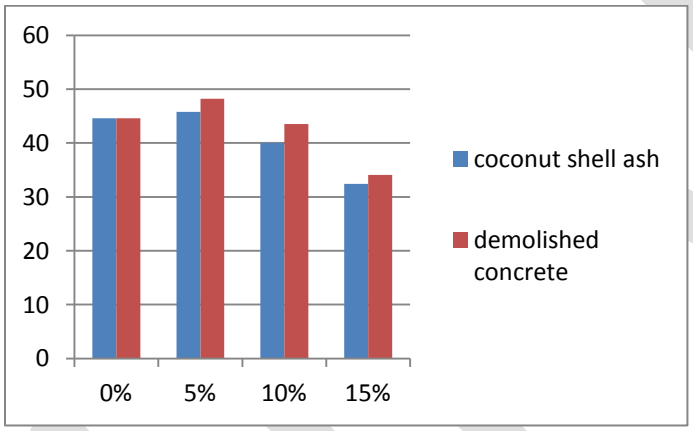

Figure 6: 28 days compressive strength

Figure 7 shows the 7days compressive strength of coconut shell ash and demolished waste combination added concrete

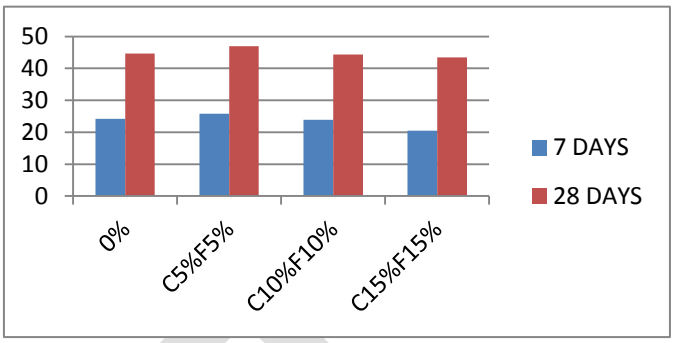

Figure 7: compressive strength

CONCLUSION

The combination of the coconut shell ash and demolished concrete waste is added in various ratio for cement and fine aggregate replacement it was found that 5% coconut shell ash and 5% demolished waste material can be replace for cement and fine aggregate its reduce the cost and materials improved our recycle system

.REFERENCES

- *Shetty M .S., " Concrete Technology", Chand and company, 2005.*
- *Asif Husain 2013"Utilization of Demolished Concrete Waste for New Construction",World Academy of Science, Engineering and Technology Vol.73 ,pp. 605-609*
- *De Brito 2007 "The effect of superplasticisers on workability and compressive strength in fine recycle concrete aggregateconstruction and materials Vol.28 ,page 722-729*
- *B.Chatveera, 2006 "Effect Of Siudge Water From Ready-Mixed Concrete Plant On Properties And Durability Of Concrete , cement and concrete composites Vol.28 ,pp.441-450*
- *S O Ekolu And A Dawneerangen 2010 "Evaluation Of Recycled Water Recovered*

From A Ready-Mix Concrete Plant For Reuse In Concrete" Journal Of The South African Institution Of Civil

- *EngineeringVol.52 ,No 2, , Pages 77–82, Paper 714*
- *MohdMonish, 2012 "Utilization Of Demolished Waste As Fine Aggregate In Concrete" J.Acad.Indus.Res .Vol.1(7) page 38-42*
- *Olanipekun2005 "amendment techniques for upland rice production in Northern Laos 1. Soil physical properties, leaf SPAD and grain yield Field Crops Research. Vol. 111, pp.81–84*
- *OkereChinenye Elizabeth 2013"Strength Properties Of Coconut Fiber Ash Concrete" Journal Of Research In Architecture And Civil Engineering Vol.1,ISSU 1*
- *Utsev, Taku 2012 "Coconut Shell Ash As Partial Replacement Of Ordinary Portland Cement In Concrete Production" International Journal Of Scientific & Technology Research Vol 1,pag 325-357*
- *Tukiman 2009 "Utilization Of coconut shell Waste As Fine Aggregate In Concrete " cement and concrete compositesVol 43, pp. 468-493*