ISSN: 2348-2079

Volume-10 Issue-4

International Journal of Intellectual Advancements and Research in Engineering Computations

Comparison of Floating Coconut Shell Light Weight Aggregate Concreteand Various Light Weight Aggregate Concretes for construction of Prefabricated Farm Structures

G. Tamilarasi[1], M. Ponni[2]

[1] Ph.D., Scholar & Assistant Professor, KSR College of Engineering , Tiruchengode – 637 215
Lecturer[2] , Thiagarajar Polytechnic College, Salem-636 005, Tamilnadu, India

Corresponding Author: G. Tamilarasi

ABSTRACT

The Characteristics of the Coconut Shell Crete was assured from the parameters such as heat and sound insulations. At the Heat insulation, the well effects of different Coconut Shell slab material was cooled indoor air and it is very suitable for Animal shed which is our required farm structures Temperature will be measured 150mm from the above floor level on the top of any type of floor, then it is compared with our innovative floors. Quality consideredin five forms such as strength, workability, durability, computability and thermal capability. Surfactants used as a Foaming agent, it will be effectively used to attain quality products for efficient working aerated achieved with Ca $(OH)_2$ with aluminum powder. To improve thermal comfort in our animal dwellings life as well as Silo implementations, we will follow Coconut Shell Crete flooring and roofing. Quality Life Scale from 0 top 7 will be used in this research. To achieve healthy environment in animal life, especially Cow, we will ensure safety and security life of floating concrete slabs which can lay on ground without any anchoring. At various economical situations, we can make all our animal dwellings with Coconut Shell Crete.

Keywords: Quality Life Scale, Animal dwellings, Coconut shell Crete

INTRODUCTION

Quality coconut shell with surfactants additive as a substitute for natural light weight aggregate concrete is an economical way for a sustainable concrete construction practices and it acts as a carbonation protection material. In this study, thermal properties of coconut shell with surfactants additive will be analysed. The most relevant thermal properties such as thermal conductivity, specific heat and thermal diffusivity found at 0%, 10%, 20%, 30% and 40% up to 100% replacement of coarse gravel. Experimental investigation on mechanical properties and fracture toughness of user -friendly concrete produced, using coconut shell as coarse aggregate, over burnt clay as a partial replacement for cement and manufactured sand as fine aggregate. The stress-strain behaviour of coconut shell concrete incorporating over burnt clay and manufactured sand was obtained and it was in good fit with popovics mode. (Mo et d., 2015). (1) Coconut shell concrete of grade M20 was achieved using 401Kg/m3 of cement by conceal curing. The flexural behaviour of under reinforced and over reinforced coconut shell concrete designed by limit state method using the actual stress-strain behaviour is analogous with the experimental values. The deflection and crack width of coconut shell concrete is comparable with the permissible values given by IS456:2000, ACI-318 and EC 2: 1992. (2)The bond properties were determined through pull-out test. Coconut shell concrete can be classified under structural lightweight concrete. The results showed that the experimental bond strength as estimated by BS 8110 and IS 456:2000 for the mix selected. (3) Foamed concrete possesses characteristics such as high strength-to-weight ratio and low density. Foamed concrete reduces dead loads on the structure, saves energy and lowers the labour cost during construction. The foaming agent used to generate foam is sodium lauryl ether sulphate. (4) Foam concrete can have 10% to 70% air, which results in a material that is light weight but may compromise the compressive strength and durability properties. (5) The thermal conductivity of aerated foamed concrete varies from 0.021 – 0.035 W/mK. Foam concrete has good potential to be used for light weight structural applications for low-rise buildings owing to its evolution of mechanical properties, transport properties and thermal resistance.

Methods of Studyingcoconut Shell Light Weight Aggregate

1. Coconut Shell

Coconut shell can be grouped under light weight aggregate. It can also be used in concrete to solve environmental and economic problem.

Fig 1: Coconut Shell

The coconut shells were crushed manually using hammers to a size such that passes through a 20mm sieve and retained on 4.75mm sieve. The material passed through 20mm size was used to replace coarse aggregate. Crushed shells were washed to remove fibers, mud etc., from them. The washed shells were dried in sunlight for 2 days. The crushed edges were rough and spiky. The surface texture of the shell was fairly smooth on concave and rough on convex faces. (6) Coconut shell aggregates used were in saturated surface dry condition.Coconut shell is the strongest part covered in coconut fruit. Coconut shell is located in between the coconut flesh and coconut husk. This shell is naturally created to protect the inner part of coconut. This is shell isuse to produce various handicraft applies and other applications. Most of handmade decorative are created by using coconut shell due to their strength.(7) Coconut shells are also used to made charcoal which is use as fuel and this coconut charcoals are far better than other charcoals. Coconut shell charcoal is widely used to produce active carbon. Normally active carbon is known as the charcoal which has treated with oxygens. Active carbon isuse widely for removing impurities. This coconut shell charcoals are widely used in purification industry and other industries which active carbon are used. (8) Most of South Asian and Pacific countries where coconut grows create various handicrafts out of coconut shells. The strong form of this shell is ideal to create handicrafts and these handicrafts keep for longer time period due to the strength of coconut shell. There is a huge demand for these types of natural handicraft in all over the world.

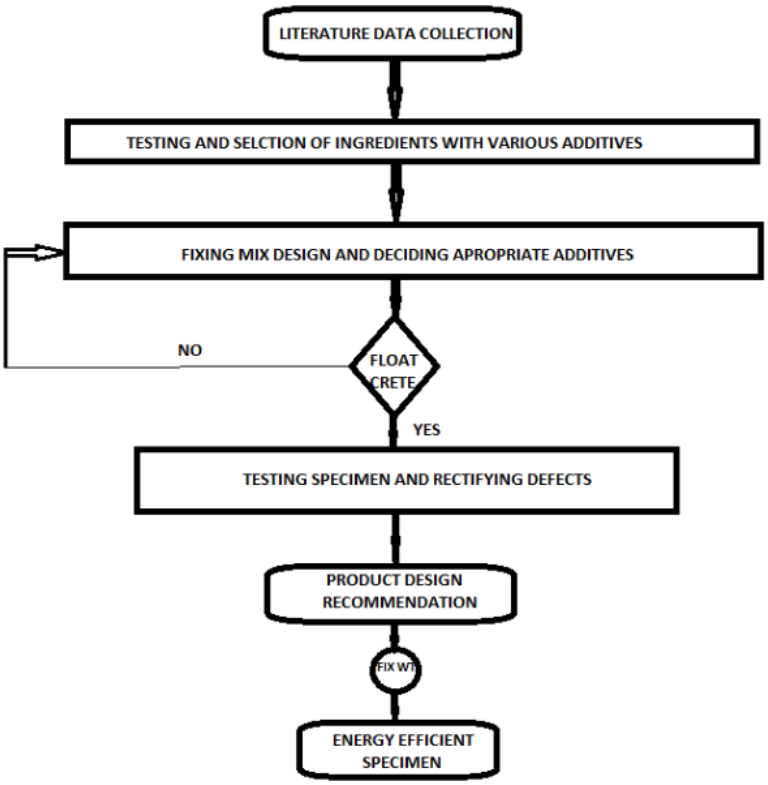
There is various method uses to produce active carbon and coconut shell produce the top-grade active carbon charcoal which got great performances. There are lots of coconut shells need to produce 1 kg of active carbon but the charcoal created from coconut shell are much clean and good in quality compare to other charcoals productions. (9) Coconut shell based active carbon production got great demand due to its high quality and there are various plants produce this active carbon from coconut shell in Sri Lanka, India and other Pacific countries where the coconut trees are available. (10)

Quality Assurance Scale

Consider a lot of qualities which are involved in concrete preparation

- Strength,
- Workability,
- Durability,
- Computability and
- Thermal capability

METHODOLOGY



RESULT AND DISCUSSION

Quality chart explained all the properties that can make up the product and determine the intermediate determinant parameters will ensures as shown in table no:1, known as the property list. Various quality ranking numbers are confirmed. Cost estimate will be done by using Quality scales as shown in fig:2. Once the quality scale number determined, product can be easily introduced in the market.

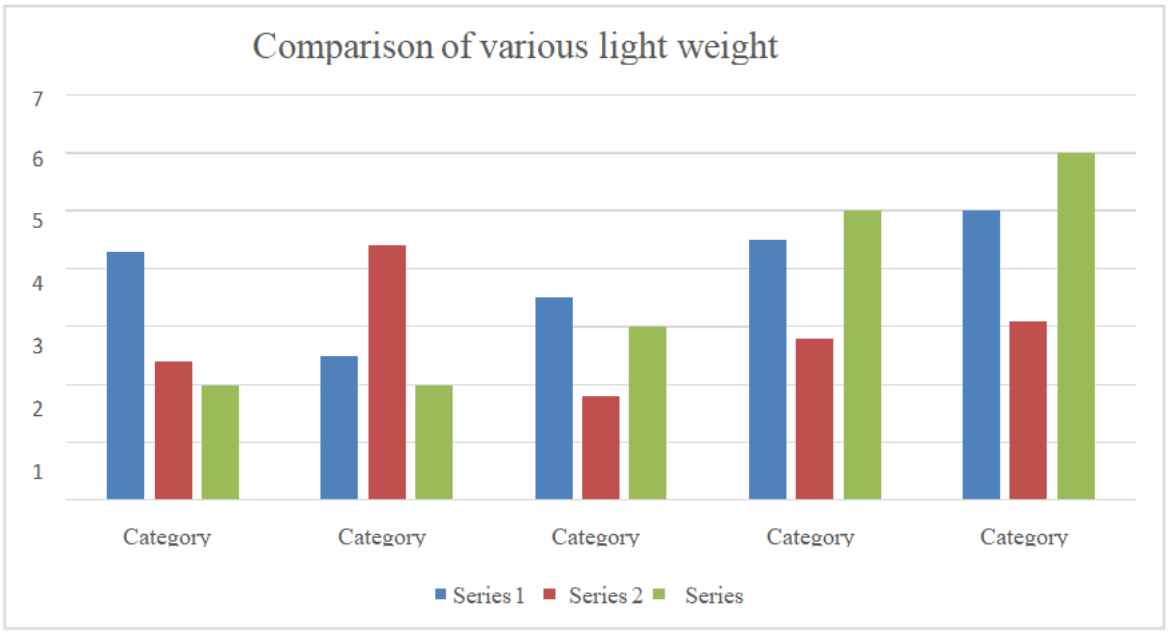


Table 1: Quality Grades

Quality Grade No	Description
0	Very Poor
1	Poor

2	Good
3	Very Good
4	Excellent

Quality Chart analysismethods vary, but it helps in a particular animal shed pattern

- Floatability of coconut shell concrete
- Light weight coconut shell concrete
- Foam coconut shell concrete
- Aerated Coconut shell concrete
- X- axis light weight aggregate grade and Y- axis quality life scale numbers.
- A Red indicator is our Floating Coconut shell light weight concrete grade which can arrange and tackle property of product complications economically as well as blue indicates light weight aggregate concrete, thus green as Coconut shell concrete.

CONCLUSION

Floating Coconut Shell Light Weight Aggregate Concrete is an economical concrete can get comfort temprature to animal sheds and silos. Thus it can ensure thermal comfort. It tends to lay proper roofing and flooring thermalinsulating material in economic system of sheds as well as silos. It has an excellent coolant property and gives repairs and rehabilitation of animal shed ceiling works. Economical cost of construction and repair amount willbe reduced. Thus, we can enjoy good moisture level automatically without using any farming arrangements. Prefabricated Floating coconut shell light weight aggregate concrete is a fine product to lay economical animal shed and silo cover constructions.

REFERENCES

1. Gunasekaran K, Annadurai R, Chandar SP, Anandh S. Study for the relevance of coconut shell aggregate concrete non-pressure pipe. Ain Shams Eng J. 2017;8(4):523-30. doi: 10.1016/j.asej.2016.02.011.
2. Oluwafemi IJ, Laseinde TO, Akinwamide J. Data showing the effects of geotechnical properties of lateritic soil mixed with coconut shell powder in Ado-Ekiti, south western Nigeria. Data Brief. 2019;24:103861. doi: 10.1016/j.dib.2019.103861, PMID 31193202.
3. Joshua O, Olusola KO, Busari AA, Omuh IO, Ogunde AO, Amusan LM et al. Data on the pozzolanic activity in coconut shell ash (CSA) for use in sustainable construction. Data Brief. 2018;18:1142-5. doi: 10.1016/j.dib.2018.03.125, PMID 29900287.
4. Palanisamy M, Kolandasamy P, Awoyera P, Gobinath R, Muthusamy S, Krishnasamy TR et al. Permeability properties of lightweight self-consolidating concrete made with coconut shell aggregate. J Mater Res Technol. 2020;9(3):3547-57. doi: 10.1016/j.jmrt.2020.01.092.
5. Filipponi P, Polettini A, Pomi R, Sirini P. Physical and mechanical properties of cement based products containing incineration bottom ash. Waste Manag. 2003;23(2):145-56. doi: 10.1016/S0956-053X(02)00041-7, PMID 12623089.
6. Dhir Rk,Paine KA, dyer TD, tang MC. Value added recycling of domestic,industrial and construction arising's as concrete aggregate. Concr Eng Int. 2004;8(1):43-8.
7. Poon CS, Shui ZH, Lam L, Fok H, Kou SC. Influence of moisture states of natural and recycled aggregates on the slump and compressive strength of concrete. Cem Concr Res. 2005; 34(1):31-36.
8. Andrade LB, Rocha JC, Cheriaf M. Evaluation of concrete incorporating bottom ash as a natural aggregates replacement. Waste Manag. 2007;27(9):1190-9. doi: 10.1016/j.wasman.2006.07.020, PMID 17055716.
9. Verma SK, Shrivastava S. Use of coconut shell as partly substitution of coarse aggregate - an experimental analysis. AIP Conf Proc. 2019;2158:020021. doi: 10.1063/1.5127145.
10. Crow JM. The concrete conundrum. 2. Amarnath Yerramala Ramachandrudu C, "Properties of Concrete with Coconut Shells as Aggregate Replacement,"International Journal of Engineering Inventions. 4. Y. 2006;1(6) (2012):3.
11. Kaur M, Kaur M. A review on utilization of coconut shell as coarse aggregate in mass concrete. Int J Appl Eng Res. 2012. 6. V;7(11):05-8.
12. National multicommodity exchange of India. 8. IS: 8112-1989. 43 Grade Ordinary Portland cement Specification. New Delhi: Bureau of Indian Standards. 9. BIS 383: 1970 Coarse and fine aggregate from natural sources for concrete. 9th revision. New Delhi: BIS.
13. IS: 10262-1982. Recommended guidelines for concrete Mix design bureau of Indian standards, New Delhi. New Delhi: Plain and Reinforced Concrete Code of Practice Bureau of Indian Standards. Vol. 11. IS: 456-2000.