

Study on Cellular Lightweight Concrete with Crushed Coconut shells

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Abstract – The focus of the study is to increase the compressive strength of the Cellular Lightweight Concrete using Crushed Coconut shells which is nearly available in ransom quantity. Coconut shells Contribute a high quantity of waste which is being exerted from industries such as oil mills, charcoal factories etc. India is at 3rd position in Coconut shell production all over the world. Cellular Lightweight concrete being one of the lightest concrete, it's compressive strength is comparatively low when compared to conventional concrete. Our idea is to induce Crushed Coconut Shells as Coarse Aggregate as a replacement of 15, 20, 25, 30% of Fine Aggregate in Cellular Lightweight Concrete.

Key Words: Cellular Lightweight Concete, Coconut Shells, CLC, Foam Concrete, Lightweight.

1. INTRODUCTION

Concrete contributes a high volume in the world. Concrete stays to be one of the most important material in development of Infrastructure of the nation or continent. Concrete buildings gives shelters and safety to people and other living organisms. So, concrete needs much modification for future rapid developing environment.

1.1 Existing Cellular Lightweight Concrete

The previously available CLC is Lightweight and Doesn't support much compressive strength. The CLC is a composite material consisting of Fine aggregate, Cement, Water and Foam. This Concrete doesn't have Coarse Aggregate because of it's Density. When normal Coarse aggregate is added due to the foam bubbles present in concrete the Coarse aggregate gets settled.

1.2 CLC with Coconut Shells

Crushed coconut shells have shown a tremendous increase in compressive strength In normal Conventional Concrete. Being one of the lightest material Coconut shells can act as Coarse aggregate and could easily mix with the foam concrete.

2. CASTING PROCESS

The manufacturing of this concrete is slightly different from other convention concrete. CLC concrete composes of Foam, Cement, Fine Aggregate, Water. In this project the coarse aggregate (Coconut Shells) will be added as a replacement by reducing the quantity of Fillers(Fine aggregate). Since there is no proper mix design for CLC, the mix proportions where calculated by trial and error method. The Below table shows the quantity of Materials required for manufacturing conventional CLC concrete of 20% Crushed Concrete Shells induced CLC concrete to fill 3 nos of 150 x 150 x 150mm cubes.

Table -1: Quantity of materials required for Convention CLC cube casting.

FOR CONVENTIONAL CLC	
CEMENT (kg)	5
FINE AGGREGATE(kg)	11.121
WATER(l)	2.02
FOAM	4%

Table -2: Quantity of materials required for 20% coconut shells replaced CLC concrete.

FOR 20% REPLACED CLC	
CEMENT(kg)	5
FINE AGGREGATE(kg)	8.89
COARSE AGGREGATE(kg)	2.22
WATER(l)	2.2
FOAM	4%



Figure-1 Cellular Lightweight Concrete mould.

3. DEMOULDING AND CURING and Testing

The concrete cubes which has been casted and left for drying was demoulded and was left for curing. The 7th, 14th, 28th day compression testing was carried out after sun drying the concrete cubes.



Figure-2: Concrete Cubes Placed for Curing

The CLC concrete Cubes with replacement of 15, 20, 25, 30% has been put batch wise for curing and then taken out and sundried for a couple of hours. Then the concrete cubes have been tested using Compression testing Machine and the compressive strength strength has been noted down. The compressive strength achieved from the concrete has been mentioned in **Table- 3**. The compression testing machine loaded with the concrete cube is shown in the **Figure-3**.



Figure -3 Testing of concrete using CTM

4. CONCLUSIONS

The Cellular lightweight concrete cubes has been tested and the results has been put in **Table-3**. The optimum replacement of Crushed Coconut Shell was found to be **20%**.

Table- 3: compressive strength of CLC after 28 days

% of replacemet of Crushed coconut shells	Compressive strenght achieved after 28 days curing period
Conventional	4.22
15	5.11
20	8.44
25	7.41
30	7.41

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