www.ijemr.net ISSN (ONLINE): 2250-0758, ISSN (PRINT): 2394-6962

Volume-7, Issue-2, March-April 2017

International Journal of Engineering and Management Research

Page Number: 306-308

Experimental Investigation on Strength Characteristics of Translucent Concrete

K.Veerappan[1], V.Venkatesh[2]

[1]Post Graduate Student, Department of Civil Engineering, Prist University, Trichy-Thanjavur Highway,Vallam, Thanjavur, INDIA

[2]Assistant Professor, Department of Civil Engineering, Prist University, Trichy-Thanjavur Highway, Vallam, Thanjavur, INDIA

ABSTRACT

The translucent concrete block is an light transmitting concrete block.so that the optical fiber is to be help the light transmission on that block. Now a day the dependence on artificial sources of energy has increased drastically. Thus, translucent concrete is the need of an hour. Translucent concrete allows natural sunlight or any light to pass through it. It reduces electricity consumption in the buildings and makes it easier for buildings to achieve higher LEED rating. But, no construction material can be used until it satisfies all the constructional requirements. For this purpose, experimental study on compressive strength of translucent concrete has been performed. As far as traditional translucent concrete is concerned, it is made up of cement, sand, fine aggregates and plastic optical fibers strands placed in alternate layers. In the present study, an experimental study is carried out and the compressive strength of translucent concrete was compared with that of traditional translucent concrete to find out the possibility of using translucent concrete for construction purposes. Safe-No electricity, heat, or ultraviolet light in the fibre optic cable.

Keyword--Metakaolin, HPC, Composite Fibres

I. INTRODUCTION

With the economic growth and science-technology development, more and more large-scale civil engineering structures such as tall buildings, underground buildings and landmark buildings and so on are built around the world. While the economic growth is a kind of extensive growth: high input, high consumption and high pollution, for that the energy saving technology is low, especially in developing countries. Optical fibre sensors such as fibre Bragg Grating, Brillouin distributed sensors and plastic optical fibre sensors have been widely used for the in situ monitoring of major projects.

For preparing mould, first polymer craft clay is spread into a flat circle, then a ring of spray paint was used to fix over clay for using it as a mould. Then, optical fibers were placed individually in the mould and then slowly the concrete was poured. After 24hours, polymer clay was pulled and the plastic ring was removed. The concrete was allowed to dry and extra fibers were cut. Sand paper was used to polish; It was observed that the concrete prepared this way, Light was able to pass through it.

OBJECTIVE

To cast a special type of concrete with light transmitting properties, to study their characteristics and to develop a functioning material which is not only energy saving but to give out artistic finish and to study the compression and flexural properties.

II. MATERIAL PROPERTIES

CEMENT

The characteristic of cement is one of the most essential parameters governing the performance of the concrete. OPC 43 grade cement with specific gravity 3.15 has been used in this investigation.

FINE AGGREGATE

River sand used in this study and collected the fine aggregate from local quarry. And sieve it using IS sieve 2.36mm. specific gravity was found to be 2.64

COARSE AGGREGATE

The coarse aggregate available from local quarry was purchased. 12.5mm aggregate was used. Specific gravity was found to be 2.78

WATER

Potable water is generally considered satisfactory for concreting purposes. Water confirming to IS 456 was used .

OPTICAL FIBER

It is an optical fibe which is made out of plastic. Plastic optical fiber of diameter 0.5mm has been used for preparing samples.

MIX PROPORTION

Concrete is mixed according to desired mix design by adding with required amount of specimens-cube, solid

block. The following are amount plastic optical fiber to added 0%,0.3%,0.4% . Slump was found to be 100mm. M30 Grade of concrete was used. Mix design was done as per IS 10262:2009 water cement ratio was kept as 0.4

III. COMPRESSIVE STRENGTH OF CUBES

Compression test is the most common test conducted on hardened concrete, partly because it is an easy test to perform, and partly because most of the desirable characteristic properties of concrete are qualitatively related to its compressive strength. The compression test is carried out on specimens cubical or cylindrical in shape prism is also sometimes used, but it is not common in our country .sometimes the compression strength of concrete is determined using parts of a beam tested in flexure. Concrete cubes of size 100 mm×100mm×100mm were cast with and without plastic optical fiber. The maximum load at failure reading was taken and the average compressive strength is calculated using the equation. The compressive strength test on both conventional, POF added concrete was performed on standard compression testing machine as per IS: 516-1959. Cubical specimens of size 100mmX100mmX100mm, cube was casted and tested for the compressive strength at the age of 7days and 28days. Strength calculated by formula load divided by area. Compression strength test are shown in table 1

Table 1Compressive strength of plastic optical fiber concrete

% PLASTIC OPTICAL FIBER	AVG COMPRESSION STRENGTH 7DAYS CURING(MPa)	AVG COMPRESSION STRENGTH 28 DAYS CURING(MPa)
0%	15.62	34.23
0.3%	19.66	37.42
0.4%	20.75	39.71

FLEXURAL STRENGTH TEST

Beam element is one of the member where flexural test is mainly done. Variability of results is less in third-point loading. In all the cases the central loading gave higher average value then the third-point loading irrespective of the size of the sample. The higher strength obtained in the case of central loading may be attributed to the fact that the beam is being subjected to the maximum stress at a pre-determined location not necessarily the weakest. In the standard methods for finding the flexural strength of concrete. The size of the prism was 500mmx100mmx100mm . Curing was done for 7 days and 28 days. Flexural strength test are shown in table 1

Table 2 Flexural Strength of of plastic optical fiber concrete

% PLASTIC OPTICAL FIBER	AVG FLEXURAL STRENGTH 7DAYS CURING(MPa)	AVG FLEXURAL STRENGTH 28 DAYS CURING(MPa)
0%	3.24	5.11
0.3%	4.28	6.86
0.4%	4.71	7.79

IV. RESULT AND DISCUSSION

1. The efficiency of the application of optical fibre is studied by comparing the strength with the normal M30 grade concrete and the test results proved that the efficiency is more in all aspect.
2. The results obtained from the compressive test shows that the increases in the compressive strength of the concrete with reinforcement of optical fibre. There is a gradual increase in the Mechanical properties of the concrete by increasing the optical fibre up to 0.3% and 0.4% of the optical fibre decreases the strength parameters.

V. CONCLUSON

1. The translucent concrete can reduce electricity bills without compromising with the strength of the building. It will reduce the energy consumption of both residential and industrial buildings.
2. Cost of manufacture of light transmitting concrete is also high due to plastic optical fibers used and care needed during manufacture. But, its cost is fully justified because of its usefulness as eco-friendly, energy efficient, aesthetically beautiful, sustainable, etc.
3. By using this concrete, higher energy efficiency ratings can be ensured as it is a green building construction material.
4. Thus, the reinforcing of optical fibre will transmit light and also eventually increases the strength of the concrete.
5. Flexural strength and compression strength were found to be increasing for 0.3% and 0.4% than control concrete.

REFERENCE

[1] Bashbash, Basma F., et al. "Basics of Light Transmitting Concrete." Global Advanced Research Journal of Engineering 2.3 (2013): 076-083.

[2] Bhushan, MNV Padma, D. Johnson, and Md Afzal Basheer Pasha. "Optical Fibres in the Modeling of Translucent Concrete Blocks." International Journal of Engineering Research and Applications 3.3 (2013): 13-17.
[3] Basma F. Bashbash (2013) paper on "Basics of light Transmitting Concrete", (2013).
[4] AkshayaB.KAmdi, paper on "Transparent concrete as a Green Material For Building", ISSN2319-6009.Volu 2, No.3, August 2013.
[5] BhavinK.Kashiyani, et.al "A Study on Transparent Concrete: A Novel Architectural Material to Explore Construction Sector" IJEIT.
[6] Jianping He. (2011). "Study on Smart Transparent Concrete Product and its performances", 6thinternational workshop on advanced smart materials and smart structures technology, (2011).
[7] IS: 10262-2009 Recommended Guidelines for Concrete Mix Design.