IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 10, Issue 11, November 2023

DOI: 10.17148/IARJSET.2023.101120

EXPERIMENTAL INVESTIGATION ON LIGHT INTENSITY ON TRANSPARENT CONCRETE

Dr. V. Murugesh Ph. D[1], Dr. Harikumar Pallathadka[2], Prof. Rajesh. P. Chinchewadi[3]

Assoc. Prof, JCTCET and Post-Doctoral Research Fellow, Manipur International University, Imphal, Manipur [1]

Vice-chancellor and Professor, Manipur International University, Imphal, Manipur[2]

Dean and Professor, Manipur International University, Imphal, Manipur[3]

Abstract: Transparent concrete, often referred to as translucent concrete or light transmission concrete, is a novel form of concrete that was created in the contemporary period and has the unique ability of transmitting light because it contains glass rods or optical fibers. With unique qualities including low density and thermal conductivity, it is lighter than traditional concrete and has the primary benefits of less dead weight, quicker building rates during construction, and less haulage and handling costs. Light is transferred from one surface of the brick wall to the other thanks to glass rods along the total width of the wall which allows light to pass through. An optical glass fiber, often known as an optical fiber, is a transparent, flexible fiber that is slightly thicker than human hair and is composed of glass (silica) or plastic. It may be used as a "light pipe" or waveguide to transfer light between its two ends. The primary goal of the project is to create translucent concrete blocks by utilizing glass rods and optical fibers with cement and sand, and then comparing their different engineering and physical characteristics to those of conventional concrete blocks. This will be accomplished by adding glass rods and optical fibers at intervals of one centimeter, or 1.3%, 1.6%, 1.9%, and 1.7% of the weight of the concrete mix, respectively. This project's primary goal is to investigate the compressive strength and density values of concrete cubes measuring 100 mm by 100 mm by 100 mm, for varying fiber percentages ranging from 0% to 1.9%.

Key words: Transmitting Concrete, Compressive Strength, Density Of Concrete, Optical Fibers

I. INTRODUCTION

Concrete is a building material made of cement (usually Portland cement), aggregate (usually a coarse aggregate like granite, limestone, or gravel plus a fine aggregate like sand), water, and chemical admixtures. Other cementitious materials included in the mixture are fly ash and slag cement. The term "concretus" (which meaning "hardened" or "hard") is the root of the English word "concrete."Concrete undergoes hydration, a chemical process that causes it to harden and solidify after being mixed with water. More concrete than any other man-made substance is utilized worldwide.

More than one cubic meter of concrete is produced annually—roughly seven cubic kilo meters for every person on Earth as of 2006. Portland cement was patented by Thomas Edison in 1907. Since then, it has been used to a wide range of purposes.

Concrete is used to make a variety of items, including buildings, furniture, sinks, and sidewalks. Concrete is created by combining cement, a dry powder, with water and other ingredients. In the last ten years, innovative cement and concrete formulations have been developed that have the ability to bend, sprout plants, and allow light to pass through.

II. OBJECTIVES

1.To build a unique kind of "light transmitting concrete" for building.

2. To conduct an experimental investigation on the light transmittance intensity of light transmitting concrete utilizing halogen and incandescent light sources of known intensity in relation to different plastic optical fiber percentages in the light transmitting concrete.

3. To investigate the compressive strength of light-transmitting concrete using the "IS 516:1959 methods of test for strength of concrete" by adjusting the concrete's grade and plastic optical fiber %.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 10, Issue 11, November 2023

DOI: 10.17148/IARJSET.2023.101120

III. EXPERIMENTAL PROGRAM

An elaborate experimental program was designed to meet the goals of this study, which included analyzing the features of light transmittance and assessing the compressive strength of the concrete that transmits light for different plastic optical fiber ratios.The next test program was designed to look at compressive strength and light transmittance. Permeability of the concrete that transmits light in terms of air and water Ordinary Portland Cement (OPC), sand, coarse aggregate, plastic optical fiber, and water are the elements of light-transmitting concrete. Tests were conducted in accordance with the Indian Standard Codes of Practice to determine the physical qualities of these materials.

1. Getting the concrete design mix.
2. Casting and curing specimens in accordance with test specifications.
3. Examining specimens for compressive strength and light transmittance properties.
4. Examining the data to determine the different characteristics of the concrete that transmits light

Experimental setup for light guiding property test

In order to investigate the light-guiding characteristic of light-transmitting concrete, P.O.F volume ratio samples of 0.00%, 1%, 2%, and 3% were cast. A photometer, also known as a lux meter, which measures light intensity in lumens and has a range of 0.1 to 1,00,000 lux, was used to test the transmittance. The 200W incandescent light bulb and the 500W halogen light bulb were selected as the light sources.

A wooden box was fitted with a light source on one side and a photometer on the other, ensuring that all light emitted by the sample fell within the photometer box. Photometer readings of transmitted light were recorded. Care was taken to ensure that the photometer box was appropriately mounted and that all light that was transmitted fell into the box.

FIG1-CUBE MOULD

SL.NO	OPTICAL FIBRE	RATE OF LUMENS
1	0.2%	1%
2	0.4%	1.5%
3	0.6%	1.8%
4	0.8%	2%
5	1.0%	2.4%
6	1.2%	2.5%

By addition of optical fibre, the rate of lumens will be increased. One of the best building materials is light-transmitting concrete. It may be applied to green buildings to improve the building's energy efficiency.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 10, Issue 11, November 2023

DOI: 10.17148/IARJSET.2023.101120

IV. CONCLUSION

The findings of this experiment allow for the following deductions to be made.

1. One of the best building materials is light-transmitting concrete. It may be applied to green buildings to improve the building's energy efficiency.
2. It is unquestionably the material of the future for civil engineering construction, and as time goes on, its application in the industry will grow.
3. As the proportion of the POF rises, the transmittance (ratio%) of 100 and 200 w grows.
4. As the amount of the POF increases, the density of the concrete that transmits light decreases. 5. As the proportion of the POF increases, the compressive strength values for 7, 14, and 28 days of curing decrease.

REFERENCES

[1]. Shing Mei Chiew, Izni Syahrizal Ibrahim,et al., (2020), ―DEVELOPMENT OF LIGHTTRANSMITTING CONCRETE‖, Materials Today: Proceedings.
[2]. H.B.Valambhiya, T.J.Tuvar, P.V.Rayjada, et al., (2017), ―HISTORY AND CASE STUDY ON LIGHT TRANSMITTING CONCRETE‖. Journal of Emerging Technologies and Innovative Research (JETIR).
[3]. Awadhesh Kumar, Rahul Ahlawat, et al., (2016) , ―EXPERIMENTAL STUDY ON LIGHT TRANSMITTING CONCRETE‖. IJISET - International Journal of Innovative Science, Engineering & Technology.
[4]. Poornima D, Shailaja T, Pooja H P, et al., (2019), ―AN EXPERIMENTAL STUDY ON Journal of Engineering Sciences Vol 13 Issue 08,2022,ISSN:0377-9254 www.jespublication.com Page 592 LIGHT TRANSMITTING CONCRETE‖. International Research Journal of Engineering and Technology (IRJET).
[5]. Kavya S, Karthik D, Sivaraja M, et al., (2016) ―AN EXPERIMENTAL STUDY ON LIGHTEMITTING CONCRETE‖. International Journal of Advanced Research in Education & Technology (IJARET).
[6]. Nikhil k, Ummer farook nk, Silal ahmed ks, et al., (2016), ―Experimental Analysis of Translucent Concrete by using Optical Fibers‖, SSR G International Journal of Civil Engineering (SSRG-IJCE).
[7]. Bhruguli Gandhi, et al., (2018), ―REVIEW ON LIGHT EMITTING CONCRETE‖, International Journal For Technological Research In Engineering.
[8]. A Jayaraman, et al., (2020), ―LIGHT TRANSMITTING CONCRETE USING ECO FRIENDLY MATERIALS (WASTE MATERIALS)‖