

A Study on Transparent Concrete

[¹]Dr. K.Chandramouli,[²]Dr.N.Pannirselvam , [³]Dr.D.Vijaya Kumar,[⁴]Sagar Reddy Avuthu, [⁵]V.Anitha

[¹]Professor & HOD, Department of Civil Engineering, NRI Institute of Technology, Visadala(V), Medikonduru(M), Guntur, Andhra Pradesh, INDIA

[²]Associate Professor, Department of Civil Engineering, SRM Institute of Science & Technology, Kattankulathur, Chennai, INDIA

[³]Principal & Professor, Department of Civil Engineering, Kodada Institute of Technology&Science for Women,Kodada,Andhra Pradesh, INDIA

[⁴]Post Graduate student, Guntur, Andhra Pradesh, INDIA

[⁵]Asst. Professor, Department of Civil Engineering, NRI Institute of Technology, Visadala(V), Medikonduru(M), Guntur, Andhra Pradesh, INDIA
Corresponding Author: Dr. K.Chandramouli

ABSTRACT: Transparent cement is a solid based building material with light-Tran message properties because of implanted light optical components generally Optical filaments. Light is directed through the stone from one end to the next. In this manner the strands need to experience the entire question. Straightforward cement is otherwise called the translucent concrete and light transmitting cement in view of its properties. It is utilized in fine design as an exterior material and for cladding of inside dividers. In this paper, to coordinate the benefits of concrete and optical fiber, for creating straightforward cement by organizing the high numerical gap Plastic Optical Fibers (POF) or huge measurement glass optical fiber into cement. The primary object is to utilize daylight as a light source to lessen the power utilization of brightening and to utilize the optical fiber to detect the worry of structures and furthermore utilize this solid as an engineering reason for good aesthetical perspective of the building.

KEY WORDS: Architectural, Concrete, Optical Fiber,Transparent Concrete.

Date of Submission: 24-01-2019

Date of acceptance: 08-02-2019

I. INTRODUCTION

Only a couple of decades prior cement was regularly misconstrued, loathed and caught by its picture settled because of the fast urbanization of the 1960s. In any case, since that time, concrete has gained extensive ground, in specialized terms, as well as in tasteful terms. It is never again the overwhelming, cool and dim material of the past; it has turned out to be excellent and energetic. By research and advancement, recently created cement has been made which is more safe, lighter, white or hued, and so on. Concrete has figured out how to adjust to every single new test that showed up. In 2001, the idea of straightforward cement was first advanced by Hungarian designer Aron Losonzi, and the principal straightforward solid square was effectively created by blending substantial measure of glass fiber into cement in 2003, named as LiTraCon. Joel S. what's more, Sergio O.G. built up a straightforward solid material, which can permit 80% light through and just 30% of weight of basic cement. It merits referencing that Italian Pavilion in Shanghai Expo 2010 demonstrates a sort of straightforward cement formed by blending glass into cement in 2010. While the straightforward cement for the most part centers around straightforwardness and its target of utilization relates to green innovation and creative wrap up. In this manner it is basic to build up another practical material to fulfill the structure as far as security checking, (for example, harm location, fire cautioning) natural assurance and vitality sparing and masterful demonstrating. Straightforward or translucent cement can be viewed as an ongoing response to the planners call for more Transparent Architecture.

Product	Litracon- Light Transmitting Concrete
Form	Prefabricated blocks
Ingredients	96% concrete, 4% optical fibre
Density	2100-2400 Kg/m ²
Block size	600mm x 300mm
Thickness	25-500mm
Colour	White, Grey or Black
Fiber distribution	Organic
Finished	Polished
Compressive strength	50 N/mm ²
Bending tensile strength	7 N/mm ²

Table 1: Properties of Transparent Concrete Blocks ByLitracon CompanyFigure 1:<https://www.google.co.in/search?q=translucent+concrete+images&tbo=isch&source=iu&ictx>

II. MATERIAL USED FOR TRANSPARENT CONCRETE

There are two essential materials utilized for making straightforward solid, one is from development field and another from detecting field. To begin with, concrete is a standout amongst the most imperative structural building materials with the upsides of rich crude materials, minimal effort and basic generation process and second the optical fiber has great light managing property which can be mastermind to transmit the light and the daylight transmit as per pre-plan street without light-warm, light-electrical or photochemical process, and photograph versatile impact which can be utilized to examine the pressure dispersion of structures. Consolidating the upsides of the solid and optical fiber, building up a novel useful material called straightforward cement has an imperative incentive in the utilization of development and detecting.

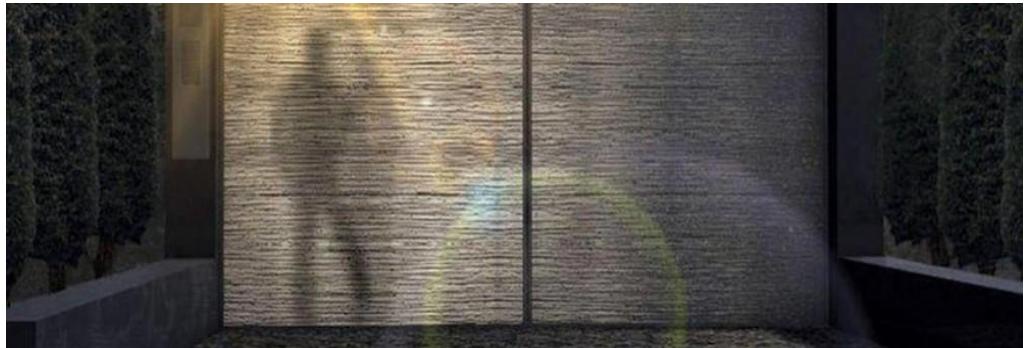


Figure 2:<https://www.google.co.in/search?q=translucent+concrete+images&tbo=isch&source=iu&ictx>

III. MANUFACTURING PROCESS

The assembling procedure of straightforward cement is relatively same as ordinary cement. Just optical strands are spread all through the total and concrete blend. Little layers of the solid are poured over one another and mixed with the strands and are then associated. A great many strands of optical filaments are thrown into cement to transmit light, either characteristic or artificial. Light-transmitting concrete is created by adding 4% to 5% optical strands by volume into the solid blend. The solid blend is produced using fine materials just it doesn't contain coarse total. Thickness of the optical strands can be fluctuated between 2 μm and 2 mm to suit the specific necessities of light transmission. Automatic generation forms utilize woven strands texture rather than single fibers. Texture and cement are then again embedded into molds at interims of roughly 2 mm to 5 mm. Smaller or more slender layers enable an expanded measure of light to go through the solid. Following throwing, the material is cut into boards or squares of the predetermined thickness and the surface is then ordinarily cleaned, bringing about completes the process of going from semi-sparkle to polished.

Applications

- Transparent solid squares reasonable for floors, asphalt and load-bearing dividers.
- Facades, inside divider cladding and isolating dividers dependent on thin boards.
- Partitions divider and it very well may be utilized where the daylight does not reach legitimately.
- In furniture for the enriching and tasteful reason.
- Light installations.
- Light walkways around evening time.
- Increasing perceptibility in dim tram stations.
- Lighting indoor emergency exits in case of a Vallabh Vidyanagar, Gujarat, India for their inspirational control failure and infrastructural support to complete this exploration.
- Illuminating hindrances on roadways around evening time.

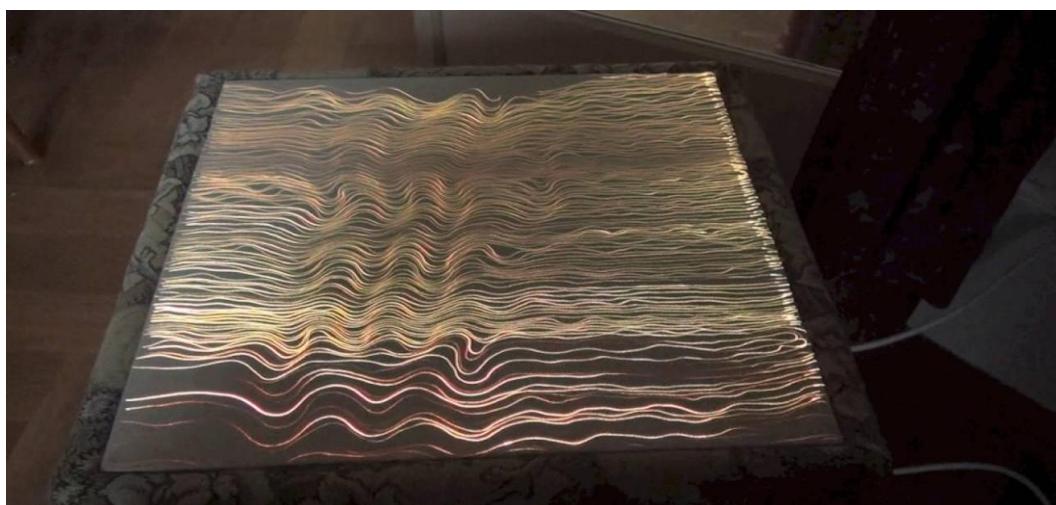


Figure 3:<https://www.google.co.in/search?q=translucent+concrete+images&tbo=isch&source=iu&ictx>

Advantages and Disadvantages

- The principle preferred standpoint of these items is that on huge scale protests the surface is as yet noticeable - while the surface of better translucent cement ends up ill-defined at separation.
- When a strong divider is permeated with the capacity to transmit light, it implies that a home can utilize less lights in their home amid sunshine hours.
- It has great structural properties for giving great aesthetical view to the building.
- Where light can't come legitimately at that put straightforward cement can be utilized.
- Energy sparing should be possible by use of straightforward cement in building.
- Totally condition neighborly on account of its light transmitting qualities, so vitality utilization can be diminished.
- The primary impediment is these solid is expensive in view of the optical filaments.
- Casting of straightforward solid square is troublesome for the work so exceptional gifted individual is required.

IV. CONCLUSION

An epic design material called straightforward cement can be produced by including optical fiber or expansive distance across glass fiber in the solid blend. The straightforward cement has great light directing property and the proportion of optical fiber volume to concrete is extent to transmission. The straightforward cement not loses the quality parameter when contrasted with ordinary cement and furthermore it has extremely imperative property for the aesthetical perspective. It tends to be utilized for the best structural appearance of the building. Likewise utilized where the light can't reach with proper power. This new sort of building material can coordinate the idea of efficient power vitality sparing with the use self-detecting properties of practical materials.

REFERENCES

- [1]. D.D.L. Chung. Cement Reinforced with Short Carbon Fibers: A Multifunctional Material. Composites: part b.31:511-526, 2000.
- [2]. F. Ansari. Practical Implementation of Optical Fiber Sensors in Civil Structural Health Monitoring. Journal of Intelligent Material Systems and Structures, 18(8):879-889, 2007.
- [3]. H.LI, H.G. Xiao, J.P. OU. Microstructure of Cement Mortar with Nano-Particles. Composites Part B Engineering, 35:185-189, 2004.
- [4]. Jianping He, Zhi Zhou, Jinping Ou, Minghua Huang, Study on Smart Transparent Concrete Product and Its Performances, Dalian, China, 2011.
- [5]. Kalymnios, D. Plastic Optical Fibers (POF) in sensing – Current Status and Prospects. 17th International Conference on Optical Fiber Sensors SPIE, 5855, 2005.
- [6]. K.S.C. Kuang, M. Maalej, S.T. Quek. Hybrid Optical Fiber Sensor System Based on Fiber Bragg Gratings and Plastic Optical Fibers for Health Monitoring of Engineering Structures. Proc. of SPIE, 6174(61742P): 1-12, 2006.
- [7]. Scherafe, T. Fabric Structure Outpace Applications: Recent Structural Development Expand the Range of Fabric Options. Building Design and Construction, pp.128-138, 1988
- [8]. Victoria Bailey, "Translucent Concrete", MEEN 3344-001.
- [9]. Z. Zhou, J.P. Ou, and B. Wang. Smart FRP-OFGB Bars and their Application in Reinforced Concrete Beams. Proceedings of the First International Conference on Structural Health Monitoring and Intelligent Structure, Japan: 861-866, 2003.