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TRANSLUCENT CONCRETE: A RESEARCH PAPER

Abhishek Pratap Singh[1], Sanjay kumar[2], Pankaj yadav[3],

Piyush chauhan[4], Govind chaurasia[5], Hariom kumar[6]

[1]Resarch scholar, Civil department, B.I.T., Gorakhpur, U.P. (India).

[2]lecturar, Civil department, B.I.T., Gorakhpur, U.P. (India).

[3,4,5,6] are the associate research scholar, civil department, B.I.T., Gorakhpur, U.P. (India)

ABSTRACT

In this research paper we are casting a block and slab of size 18×7×7 cm^3 & 100×7×300cm^3 respectively by using cement, sand, aggregate, with optical fiber & glass. In this research paper we should try to reduce its cost by using glass rod with the small composition of optical fiber. We observed the light transmission in this block is 90-95% & minor loss of energy can be observed. The strength of slab by using optical fiber is increased 4-5% in the comparison of the normal block & slab.

Keywords: Optical fiber, High strength concrete, transparent concrete, Aesthetic transmitting concrete, light transmitting conc.

I.INTRODUCTION

Transparent concrete was introduced first by Bernard Long as "LIGHT TRANSMMITING CONCRETE" in 1935. Mixing of 4-5% of optical fibers should be important for the manufacturing of translucent or transparent concrete. Transparent concrete is used as a façade material in architecture for a new design to get the aesthetic view to the structure. In the present time all the research concentrated towards the utilization of natural resource as much as possible. GREEN BUILDING is a good example of the utilization of natural resource as same as translucent concrete is also a good research of the researchers. It also utilize the natural resources like sunlight in the buildings and this property reduced the electricity bill, low use of artificial source of light, making a building attractive. The main purpose of the transparent concrete is to utilize the potential energy which is present in the form of sunlight. A large number of optical fibers run parallel to each other between two main surfaces. A shadow of an image appears easily and it creates the special effect that the weight and thickness of a concrete wall will disappear. Some new building materials are developed which is used in structures, including self- diagnosis smart concrete, self-tuning smart concrete, self-repairing smart concrete, soundproof concrete, thermal insulation concrete and so on. Soundproof concrete, thermal insulation concrete and so on.

II. MATERIALS USED IN TRANSLUCENT CONCRETE

There are two main basic materials are used for the making of translucent concrete, first one is from construction field and the second one is from sensing field. The optical fiber has good light guiding property and the sunlight transmit according to Pre-design road without light-heat, Photochemical process or light-electrical and photo elastic effect which can be to calculate the stress distribution of the structures.

The main material which is used for the making of transparent concrete is optical fiber.

The types of optical fiber:

1- Multimode step index fiber. (Fig.1)
2- Multimode graded index fiber. (Fig.1)
3- Single-mode step index fiber. (Fig.1)

III. PRINCIPAL

Transparent concrete works on the total internal reflection. When a light ray enters in the optical fibers from the one end or denser medium to the rarer medium then it's create an angle and that angle is greater than critical angle, the ray later reflects back to the same medium. Minor loss of the energies can be observed in this process. The main principal of the translucent concrete is totally based on the light transmission; it takes a light from the natural resource like sun. Sun is the form of pure energy all of the researchers wants to utilize the heavy energy which are comes from the sunlight.

IV. MANUFACTURING PROCESS OF TRANSPARENT CONCRETE

Step 1: Placing of optical fiber as shown in figure 2.1

Step 2: Concreting is shown in fig. 2.2

Step 3: Cutting machine is used to cut the edges of fibers.

Step 4: The finishing is required for the smoothness of the surface. After all the above process finished concrete is looks like as shown in figure 2.3&2.4.

V.RESULT

5.1- Workability

Slump cone test is preferred to check the workability of the concrete & during this test the observed slump is 92mm.

5.2- Compressive strength

By the definition of it, the compressive strength of a material is that value of the uniaxial compressive stress reached when the material fails completely.

Compressive strength = Load/Area

The compressive strength test checked in 7, 14&28 days as shown in graph 1 in N/mm^2.

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5.3- FLEXURAL STRENGTH

The flexural strength of the translucent concrete & conventional concrete is 7, 14 & 28 days as shown in a graph 2 in N/mm^2.

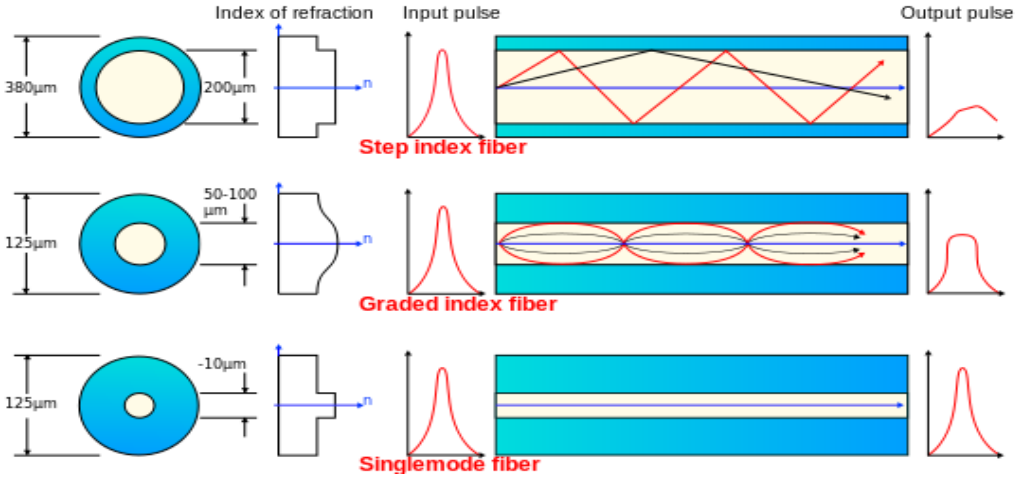
VI. FIGURES AND TABLES

Fig. 1:

4- Multimode step index fiber.

5- Multimode graded index fiber.

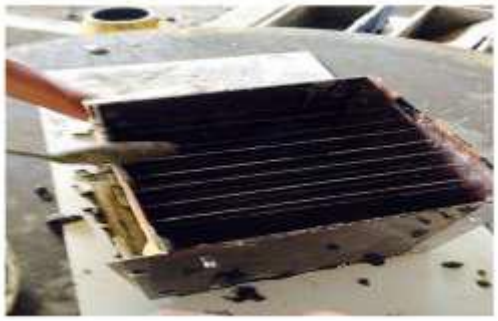
6- Single-mode step index fiber.



Types of optical fibre

Fig.2:

placing of optical fiber (Fig.2.1)



concreting(fig.2.2)

Fig.2.3

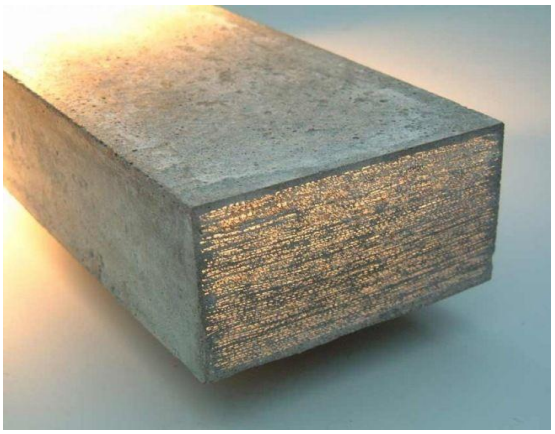


fig.2.4

Table: 1

Properties of translucent concrete

(Organic Fiber distribution)

PRODUCT	**LIGHT TRANSMITTING CONCRETE**
Form	Prefabricated blocks
Ingredients	96%concrete,4% Optical fiber
Density	2100-2400 kg/m^2
Block size	600mm × 300mm
Thickness	25-500mm
Colour	Grey, White or black
Finishing	Polished
Compressive stress	50 N/mm^2

Table: 2

Material specification

Sr.	**Material**	**Specification**
1	Cement	53 Grade
2	Coarse aggregate	Less than 10mm
3	Fine aggregate	Less than 2.36mm

4	Concrete	M 20 Grade
5	Optical fiber	2% - 4%

Table: 3

Test of materials

3.1- cement

Sr.	**Properties**	**Values**
1	Fineness	3%
2	Grade	53
3	Specific gravity	3.15
4	Initial setting time	30 min

3.2- Fine aggregate

Sr.	**Properties**	**Values obtained**
1	Fineness modulus	2.64
2	Specific gravity	2.53

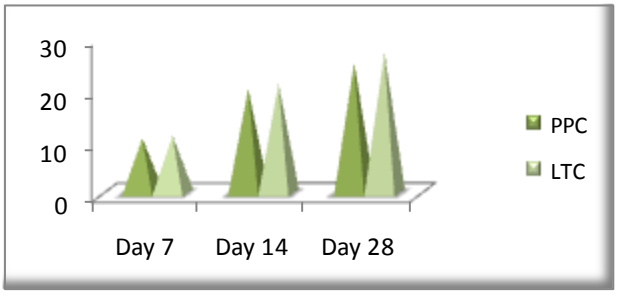
3.3- Coarse aggregate

Sr.	**Properties**	**Values**
1	Size of aggregates	10mm
2	Fineness Modulus	5.01
3	Specific gravity	2.53

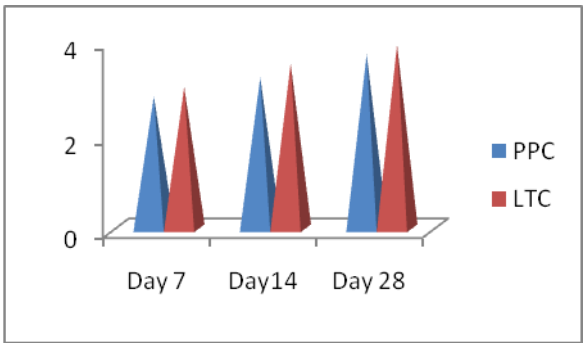
3.4- Water

Normally $_{p}$H 7 is used for mixing and curing the concrete specimen.

GRAPH



Compressive strength (Graph 1).



Flexural strength (Graph 2).

VII. CONCLUSION

Translucent concrete blocks can be used in many ways and implemented into many forms and be highly advantageous. Yet, the only drawback would be its high cost. That doesn't stop high class architects from using it. It's a great sign of attraction and artistic evolution. Any structure with a small hint of translucent concrete is bound to make heads turn and make them stand in awe. The compressive strength of Light transmitting concrete is equal to the strength of the ordinary concrete and it has the property to transmit light. If the percentage of the optical fibers increased than the strength of the concrete starts decreasing so we can conclude that the strength of translucent concrete is inversely proportional to light transmittance. Only fine aggregates are used because if we use coarse aggregates then it may destroy the optical fibers and changes their properties. Transparent concrete achieves maximum effect when used in an environment with a high degree of light contrast, such as this illuminated table in a dimly lit room. The strength results of decorative concrete are correlated with results of ordinary plain cement concrete. The results evidently show that the decorative concrete also performance based on the strength aspect is also considerably high. Hence the application of optical fiber will make the concrete decorative as well as can make the concrete structural efficient.

VIII.ACKNOWLEDMENTS

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