

COMPRESSIVE STRENGTH OF TRANSPARENT CONCRETE

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ABSTRACT-This article deals with the usage of translucent concrete and also the advantages it brings in the field of smart construction, that it can reduce the power consumption of illumination and use of optical fiber can be made and the compressive strength of translucent concrete was compared with conventional concrete to find its advantage of using optical fibers for the construction of green buildings. Optical fibers transmit light so effectively that there is virtually no loss of light conducted through the fiber by means of parallel arrange. The results show that transparent concrete gets higher light transmitting ratio with appropriate optical fiber by means of parallel arrange along the light direction. The light transmitting ratio increases and the compressive strength decreases along with the increases of optical fiber content in volume. Transparent concrete ‘ ‘ can also be called as translucent concrete.

Keyword,-----slump cone, cube mould, sieve, pychometer fiber

I. INTRODUCTION

In today living energy conservation has become an important issue .due to this reason energy expenditure and environment problem have accelerate to global scale. IN today’s we converts the environment into concrete environment so it take energy to built, to use, to construct etc. India consumes 18 to 20% of total energy for lighting the building. For saving energy we required to built green building or structure. Concrete is one of the most basic and important construction material and to reduce the consumption of energy. we can made transparent concrete by the use of optical fiber in it . This is discovered by HUNGARIAN ARCHITECT ‘‘ARON LOSONZI’’ in 2001. Because optical fiber can transmit sunlight or light without any heat, Because of light transmitting property of concrete is called transparent concrete. First transparent concrete block was named as LITRACON. Strength of this concrete is almost same as conventional concrete.

II. LITERATURE STUDY

Kashiyani et. al. [1] studied light transmitting concrete using 4% to 5% optical fibers. The fibers of diameter from 2 μ m to 2mm were used in alternate layers with concrete. The concrete was based on the principle of total internal reflection of optical fibers.

Momin et.al. [2] used six specimen of translucent concrete with varying pof as 1%,2%,3%,4%,5% and 6% with diameter of pof as 1mm. It was observed that for halogen lamp transmittance varied as 0.29%, 0.59%,0.98%, 1.41%,1.83% and 2.36% while for incandescent lamp of 200w, the transmittance was observed as 0.41%,0.82%,1.22%,1.72%,2.15% and 2.59% respectively. The difference in transmittance is due to light scattering angles of chosen lamps were different.

Zhi et. al.[3] studied the light transmitting characteristics of light transmitting concrete by making four cubes specimens of 100mm size with cement : sand: water in proportion of 1:2:0.44 and plastic optic fibers of 3.14%, 3.80%, 4.52% and 5.3%.They observed that light transmittance was varying from 1% to 2.25% of the incident light.

Jimenez and Fernandez [4] used glass fibers of 0%, 5%, 10% and 30% and determined compressive strength of concrete at 7 days and 28 days , which was reduced gradually from 33.6MPa to 25.7MPa at 7 days and 34.2MPa to 26.9MPa at 28 days .

III. MATERIAL

- Cement Ordinary Portland cement of 43 grade were used as per IS: 256 – 2015. Cement was tasted in accordance with IS : 4031
- Fine aggregate
River sand has been sieved from IS 1.18mm sieve and used. The fineness modulus of the sand was 2.4. the bulk density of sand in compacted and loose state was also determined and found as 1983kg/m³ and 1688kg/m³ respectively. The specific gravity of the sand was determined in accordance with IS : 2386(part 3)-1983 and found as2.64.
- Coarse aggregate
Coarse aggregate of 10mm and less than used. The fineness modulus of coarse aggregate was 5.84.

- Optical fiber
 Optical fiber is a transparent, flexible fiber made of extruded glass or plastic and slightly thicker than human hair.
- LIGHT THEORY OF OPTICAL FIBRE
 Optical fiber typically include a transparent core surrounded by a transparent cladding material with a lower index of refraction as shown in fig . 1. Light transmitting property is based on the principal of total internal reflection of optical fiber.

IV. EXPERIMENTAL PROGRAM

in this program special form work of size 7cm*7cm*7cm is to be made by drilling hole from any two opposite side of form work. The optical fiber is paced in these hole to transmit light and before placing of concrete and optical fiber mould should be oiled properly. Optical fiber with slight tension clamped both side. The compressive strength of the cube is determined by using compressive testing machine after 7day, 14day and 28day and compare with conventional concrete compressive strength. Optical fibers are placed in cube in different volume percentage such as 1% 2% 3% 4%.

V. RESULT

• **Table 1: Compressive Strength of conventional concrete**

Weight of cubes	Load (in KN)	Compressive strength(N/mm ²)	Age (in days)
766gm	180	36.73	28 day
785gm	185	37.75	28 day
767gm	183	37.34	28 day

• **Table 2: Compressive strength of translucent concrete**

% of optical fiber	Load (in Kn)	Compressive strength(N/mm ²)	Age (in days)
2%	167	34.08	28 day
3%	175	35.71	28 day
4%	179	36.53	28 day

VI. CONCLUSION

1. This product is multipurpose we can use it as a block in wall also as a decorative piece for small portion of the wall it save energy.
2. It give good asthetic look
3. Its strength is almost same as conventional concrete.
4. Its initial cost high but for long time it will be economical.
5. The study of transparent concrete show that it can reduce electricity bills without compromising the strength of the building.

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