



## A COMPARITIVE STUDY OF TRANSLUCENT CONCRETE

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**ABSTRACT :** Translucent concrete is a concrete based material with light-transferring properties ,acquired due to embedded light optical elements like Optical fibers used in core of the concrete. Light is passed through the concrete from one end to the other. This results into a certain light design on the other surface, depending on the fiber structure. Optical fibers transmit light so successfully that there is virtually no loss of light conducted through the fibers. This paper deals with the modelling of such translucent or transparent concrete blocks and panel and their usage and also the advantages it bring sin the field. The main aim is to use sunlight as a light source to reduce the energy consumption of illumination and to use the optical fiber to sense the strain of structures and also use this concrete as an architectural purpose of the building.

**Keywords-** *Architectural purpose, light transferring, optical fiber , translucent concrete, modelling.*

### I. INTRODUCTION

Aron Losonczy was the first Hungarian architect to invent Translucent Concrete at the Technical University of Budapest in 2001. He used optical fibers into the concrete. LiTraCon is a primary transparent concrete block produced in 2003 with the aid of using the use of the optical fibers. Due to globalization and creation of high-upward push constructing, the distance among constructing is reduced; these reasons to growing using non- renewable electricity sources, so consequently there's a want of clever creation method like inexperienced constructing and indoor thermal system.

Translucent concrete is new method distinctive from ordinary concrete. Translucent concrete allows lighter and much less weight in comparison to ordinary concrete. The use of daylight supply of light rather than using electrical power is fundamental reason of translucent concrete, to be able to lessen the weight on non- renewable source sand end result it into the power saving. Optical fibers is a sensing or transmission element, so lower the use of artificial light, the

ordinary concrete is changed via way of means of translucent concrete, which has natural lighting.

A wall made of "Light LiTraCon" has the power of conventional concrete and an embedded array of glass rods that can show a view of the outdoor world. Thousands of optical glass rods shape a matrix and run parallel to each different among the 2 predominant surfaces of each block in which wherein Shadows at the lighter aspect will appear with sharp outlines at the darker part. An optical glass fibre is a bendy obvious fibre made of glass (silica) or plastic, barely thicker than a human hair & is a three-layered cable made up of Buffer coating, cladding and center with transmits light through the center of glass rods.

Most of the big buildings are built neighboring each other all in the same areas like sky scrapers There rise one of biggest problem in deriving natural light in building due obstruction of nearby structures. Green building is a great instance of the usage of natural resource as same as translucent concrete is likewise an excellent research of the researchers. The most important motive of the transparent concrete is to make use

of the potential energy which is present in the form of sunlight.



*Fig 1 Translucent concrete wall*



*Fig 2 Optical fibers*

## II. MATERIALS

### 1. CEMENT

The cement used in this research works is Koromandal Kings 53 Grade Ordinary Portland Cement. All possessions of Cement are tested by referring IS 12269-1987 Specification for 53 Grade Ordinary Portland cement. 3.14 was the specific gravity of Cement. The initial and final setting times were found as 51 minutes and 54 minutes respectively. 40% was the Standard consistency of cement.

### 2. FINE AGGREGATE

Locally accessible sand that passed through a 4.75 mm IS sieve was used. 2.75 was the specific gravity used and 2.81 was the fineness ratio used for fine aggregate. The loose and compacted bulk Density values of sand are 1600 and 1688 kg/m respectively, the water absorption of 1.1%.

### 3. OPTICAL FIBERS ELEMENTS

**CORE-** The narrow glass center of the fiber where the light travels is called core.

**CLADDING-** The outer optical material surrounding the core that reflects the light back into the core. To enclose the

mirroring in the core, the refractive index of the core must be greater than that of the cladding.

**BUFFER COATING –** This is the overlay of plastic that protects the fiber from damage and moisture.

There are three basic types of optical fibers:

Multimode graded-index fiber, Multimode step-index fiber, and Single-mode step-index fibers.

## III. METHODOLOGY

Preliminary tests had been conducted on the normal conventional concrete materials as according to IS standards & specifications for its physical & engineering properties, cubes had been casted with inside the well-known steel moulds & vibrated to acquire the specified pattern length of the individual. The moulds had been wiped clean to begin with and oiled on all of the aspects earlier than concrete pattern is poured in to it. Thoroughly blended concrete is poured into the moulds in 3 same layers and compacted the usage of vibrating table for a small duration of five minutes. The excess concrete is eliminated out of the mold the usage of trowel and the pinnacle floor is completed with clean floor.

The production system of transparent concrete is identical as of the ordinary traditional concrete blocks with the Only alternate is optical fibers are spread during the fine aggregate and cement mix & in a wooden casted box small layers of the concrete is spout on each other . Light transmitting concrete is produced by including 1%, 2%, 3%, 4% & 5% of glass rods with the aid of using weight into the concrete combination, the translucent concrete combination is crafted from first-rate combination substances only & does not incorporate coarse aggregates. Optical fibers and concrete are alternately inserted into moulds at a period of about 1.5cm spacing & the casted materials are cut into small panels or blocks of the precise thickness sooner or later the surface is generally polished ensuing in semi-gloss to high-gloss floor finish. After 24 hours the samples of each everyday traditional concrete & translucent concrete have been demoulded and put in curing tank for the respective durations of 7, 14, 21 and 28 days & a hard and fast of five samples have been organized for each level of curing.

## IV. RESULT

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

$$\text{Compressive strength} = \text{Load/Area}$$

**Table 1 Compressive Test on Translucent Concrete  
(Comparison of 3 research paper)**

Research Papers	Days	Compressive Strength of Conventional Concrete (N/mm <sup>2</sup> )	Compressive Strength of Translucent Concrete (N/mm <sup>2</sup> )
<b>IJMER</b>	3	9.56	8.83
	7	13.02	11.45
	28	23.24	21.10
<b>IJETS</b>	7	18.9	17.6
	14	22.1	21.7
	21	23.4	24.0
	28	26.9	26.4
<b>IJARSE</b>	7	12.6	13.2
	14	17.5	18.01
	28	24.23	24.4

## V. CONCLUSION

Translucent concrete blocks can be used in lots of methods and applied into many bureaucracies and be highly advantageous. Yet, the handiest disadvantage might be its excessive cost. That doesn't forestall excessive elegance architects from using it. It's an awesome sign of enchantment and creative evolution. The compressive strength of Light transmitting concrete is slightly less to the strength of the ordinary concrete and it has the property to transmit light. The leading advantage of translucent concrete is that its light which reduces the self-weight of any concrete structure & also can be used as fancy concrete in interior design of buildings as panels in slabs, partitions. Thus the implementation of optical fiber will make the concrete decorative as well as can make the concrete structural efficient.

## VI. REFERENCES

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