

TRANSLUCENT CONCRETE

Faizan Ali , Anchal Panwar
Department of Civil Engineering
Himgiri Zee University, Dehradun, UK, India

Abstract— Translucent concrete is a concrete based building material with light trans-missive property due to embedded light optical elements usually Optical fibers and sometimes glass powder. It is also known as transparent concrete and light transmitting concrete(Li-tra-con) because of its properties of letting the light pass through it. It is used as a façade material and for cladding of walls and also as partition walls in structures. In this the optical fibers dia vary between 2 micron and 2mm in order to increase the transparency of material. The object have 95% of concrete and 5% of plastic optical fibers. And the fibers are disbursed in short direction to increase the transparency of concrete. This concrete is done to use sunlight as light source and to reduce power consumption.

Keywords— Optical fibers, Li-tra-con



Fig. 1. Cement

I. INTRODUCTION

Transparent/translucent concrete was first introduced by Bernard Long as “LIGHT TRANSMITTING CONCRETE” in 193. Mixing of 4-5% of plastic optical fibers should be important for the manufacturing of translucent concrete. It is used as a facade material in structure for a new design to get the aesthetic view of the structure. In the present time all the research concentrated towards the utilization of natural resources as much as possible and translucent concrete is a good product of researchers. It also enhances the utilization of natural resource like sunlight in the building and this property reduces the electricity consumption. A large numbers of optical fibers run parallel to each other between two main surfaces. A show of an image appears easily and it creates the special effect that the weight and thickness of the concrete will disappear.

II. MATERIALS USED

A. Cement:-

Cement is a major ingredient of binding material used in concrete. It provides good adhesive property to bind fine and coarse aggregate. We mainly use opc and ppc cement for all concretes. (fig:1)

B. Fine aggregate:-

Coarse sand is commonly used as a fine aggregate. Sand may be either natural or artificial. The fine aggregate fills the voids present in the coarse aggregates and minimizes shrinkage of concrete. The size of coarse sand should be between 75 micron to 4.5mm. (fig:2)



Fig. 2. Fine Aggregate

C. Coarse aggregate:-

Coarse aggregates are provided in concrete to provide it a strength it is used in more quantity in concrete than any other material. The standard size of aggregate we usually use in translucent concrete is 10-20mm. (fig:3)



Fig. 3. Coarse Aggregate



Fig. 5. Placement of optical fibers

D. Plastic optical fibers:-

An optical fiber is a flexible, transparent fiber made of extruded glass (silica) or plastic, slightly thicker than a human hair. It can function as a waveguide or light pipe to transmit the light between the two ends of the fiber. The field of applied science and engineering concerned with the design and application of optical fibers is known as fiber optics.

Optical fiber typically include a transparent core surrounded by a transparent cladding material with a lower index of refraction. Light is kept in the fiber by total internal reflection.



Fig. 4. Plastic Optical Fibers

IV. REAL WORLD EXAMPLES

A. The Europe Gate:-

It is located in Hungarian town, Komarom. The sun rays transmit through it in the mornings and late afternoon. In night more impressive view can be seen.



Day view



Night view

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Fig. 6. The Europe Gate

III. MIX PROPORTION & PROCEDURE

In transparent concrete 95% of volume is covered by cement mortar and remaining 5% is occupied by optical fibers. To increase transparency of concrete we can also use glass powder in place of cement but it will slightly reduce the strength of concrete.

To make a mix of transparent concrete firstly we fix the optical fibers in a mould and then we pour a concrete mortar in it. Another method is we can directly mix optical fibers in concrete mixer while preparing a mix.

B. Sella Septichora:-

It is located in Hungary. It has a door made of translucent concrete set in a steel frame.



Fig. 7. Sella Septichora

Table 1: Properties of translucent concrete:

Product	Light Transmitting Concrete
Form	Prefabricated blocks
Ingredients	95%concrete 5%Optical fibers
density	2100-2400kg/m ³
Colour	Grey, white or black
Finishing	Polished or rough
Compressive strength	50N/M ²

Table 1 shows some properties of Translucent Concrete as its density, colour, finishing type, compressive stress, etc.

V. CONCLUSION

Translucent concrete blocks can be used in many ways and implemented into many forms and be highly advantageous. Yet the only disadvantage would be its high cost. That doesn't stop high class engineers 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 "litracon" is also same as ordinary concrete. Transparent concrete achieves maximum effect when used in an environment with a high degree of light contrast. As it possess the same strength quality like normal concrete hence the application of optical fibers will make the concrete decorative as well as can make the concrete structural efficient.

VI. REFERENCE

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