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EXPERIMENTAL STUDY ON TRANSPARENCY CONCRETE

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ABSTRACT

Light transmitting concrete (Transparency concrete) is one of the advanced concrete which is used to reduce the self-weight of the concrete. This is lighter than conventional concrete. Its main specialty is its low density and thermal conductivity. The main advantages of Transparency concrete are reduction in dead weight, faster building rate in construction, lower haulage, handling cost. Light translucent concrete is one of the fiber reinforced concrete which is used for aesthetic application by incorporating the optical fibers in concrete. An optical fiber (or optical fiber) is a flexible, transparent fiber made of glass (silica) or plastic, slightly thicker than a human hair. It can function as waveguide, or "light pipe" to transmit light between the two ends of the fiber. Our project deals with Transparency light translucent concrete, in which coir pith is used partially instead of sand to reduce its self-weight. In Tamil Nadu and Kerala the availability of coconut is high so we used it as an additional material. Optical fibers are one which helps for transmission of light through fiber. And we are not using coarse aggregate due to light transmitting concrete, so this type of concrete brings more advantage in smartconstruction.

Keywords- optical fibers, lower haulage, transmission, low weight

1, INTRODUCTION

Transparency ("light transmitting concrete") is a Transparency translucent concrete building material made of fine concrete embedded with 5% by weight of optical glass fibers. Light transmitting was developed in 2001 by Hungarian architect Ron Losonczi working with scientists at the Technical University of Budapest. It can be used for interior or exterior walls, illuminated pavements or even in art or design objects. By impregnating the concrete with optical glass fibers, light can be transmitted from the outside in or inside out.

A wall made of "Transparency concrete" has the strength of traditional concrete and an embedded array of glass fibers that can display a view of the outside world, such as the silhouette of a tree, for example. Thousands of optical glass fibers form a matrix and run parallel to each other between the two main surfaces of every block. Shadows on the lighter side will appear with sharp outlines on the darker one. This special effect creates the general impression that the thickness and weight of a concrete wall will disappear. The hope is that the new material will transform the interior appearance of concrete buildings by making them feel light and airy rather than dark and heavy. The hope is that the new material will transform the interior appearance of concrete buildings by making them feel light and airy rather than dark and heavy.

2, SCOPE AND OBJECTIVE

Now days, a Small buildings are replaced by high rise buildings and sky scrapers. This arises one of the problem in deriving natural light in building, due to obstruction of nearby structures. Due to this problem use of artificial sources for illumination of building is increased by great amount. Light transmitting concrete is a concrete based building material with light-Tran missive properties due to embedded light optical elements usually Optical fibers. Building energy saving and safe evaluation for engineering structures have obtained the worldwide attention. It is much of importance for developing a new kind of building material, which can integrate green energy saving with self-sensing properties of functional material. On the performance side, it's simply a concrete embedded with optical fibers running in a matrix while still retaining the strength of concrete. Therefore it still retains the high density top layer. It is also frost and de-icing salt resistant, making it highly recommendable in cold countries. Similarly, it is under fire protection classification A2 and provides very high UV resistance.

Traditionally concrete members are considered as a structural member only, but in recent days this concept is changed and use of concrete as a decorative material for structure has come up. It is observed that high performance concrete using optical fibers can also be utilized as a decorative material to improve elegance of structure by making it.

Making concrete structures without vibrations have been done in the past. For example, placement of concrete under water is done by the use of without vibration. Mass concrete and shaft concrete can be successfully placed without vibration. But the above examples of concrete are generally of lower strength and difficult to obtain consistent quality. Transparent concrete also called as translucent concrete or light transmitting concrete is achieved by replacing aggregates with transparent alternate materials. The bonding material in transparent concrete may be able to transmit light by using clear resins the concrete mix. Use of optical fiber and fine concrete also used as transparent concrete.

3, PROPERTIES OF MATERIAL

3.1 ORDINARY PORTLAND CEMENT

Portland cement can be found in both concrete and mortar, not to mention other construction mediums such as stucco and some type of grout, where it acts as a bending agent. Portland cement is a hydraulic material, which requires the addition of water in order to form exothermic bonds, and is not soluble in water. There are different types of grade of cement are available. We have chosen 53 grade of cement which is finely grinded and also has high compressive strength compare to other grade.

3.2 FINE AGGREGATE

A minimum amount of fine arising from binders and sand must be achieved to avoid segregation. Another deficiency in aggregate is poor gradation. The use of filters is suggested as approach is used to fix the type and amount filter. Alternative, particle packing model should be used to reduce the number of experimental trials. The overall idea

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is to overcome local deficiencies in aggregate shape and to arrive at required packing characteristic irrespective of aggregate. In the view of an increase awareness of the same, use of manufactured sand and other alternative fine aggregate has become essential.

3.3 OPTICAL FIBER

The idea of using light to send messages has been developed since the eighth century B.C., when the Greeks used fire signals for sending alarms or calls for help. It was only in the mid 1960s did Charles K. Kao determined that glass had a loss of 20db/km, which spurred researchers into exploring methods for making glass more pure.

The typical fibers today are made out of glass or plastic since it is possible to make them thin and long. Also both glass and plastic are transparent at particular Wavelengths, which allow the fiber to guide light efficiently. The fiber is constructed with a core with high index surrounded by a layer of cladding at lower index. The core and cladding can be made out of both plastic and glass. For plastics, the core can be polystyrene or poly methyl methlacrylate and the cladding is generally silicone or Teflon for glasses both the cladding and the core are made out of Silica with small amounts of do pants such as Boron, Germanium to change its Index. Major differences exist between the two materials when it comes to making the optical fiber. In plastic core fibers they are more flexible and inexpensive compared to glass fibers. They are easier to install and can withstand greater stresses and weigh 60% less than glass fiber. But losses, giving them very limited use in communication applications. Such plastic fibers are practical for short run such as within buildings.

4, PROCEDURE FOR MAKING TRANSPARENCY CONCRETE

4.1 MAKING OF MOULD

You need to roll some polymer craft clay into a flat circle. Make it as level as possible, Cut out a ring from a spray paint can lid anything that is waterproof will work. After you cut it, press it into the clay. The whole point of this is to make a mold to cast the concrete.

4.2 FIBER OPTICS

Get one of those plastic fiber optic toys. They have that sort of 'frill' of glowing wires. Cut a bunch small 1 inch segments.

4.2 PLACING OF FIBERS

Fiber are placed individually in mold with some spacing are given due to avoiding interconnections

4.4 POURING OF CONCRETE

Pour the concrete carefully and slowly in fiber placed mould, the concrete is fully laid over the mould and spreading each other, there is no any air gaps

4.5 BREAKING OF MOULD

Once the concrete is cured for 24 hours, pull off the polymer clay and cut off the plastic ring. The concrete will not stick to the clay. In fact, it's practically repelled by it! That the repulsion will be easy during breaking

4.6 TRIM THE FIBERS

After you let the de-moulded concrete dry out over night, cut off the extra long fibers

4.7 POLISHING

Use sandpaper to polish and Light, even colored light, is able to pass right through and create a pixelized likeness on the opposite side.

5, TESTS METHODS FOR HARDENED PROPERTIES OF CONCRETE

5.1 COMPRESSIVE STRENGTH

Remove the specimen from water after specified curing time and wipe out excess water from the surface. Take the dimension of the specimen to the nearest 0.2m. Clean the bearing surface of the testing machine Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast. Align the specimen centrally on the base plate of the machine. Rotate the movable portion gently by hand so that it touches the top surface of the specimen. Apply the load gradually without shock and continuously at the rate of 140kg/cm2/minute till the specimen fails. Record the maximum load and note any unusual features in the type of failure.

5.2 FLEXURAL STRENGTH

The test specimen shall be placed in the machine correctly centered with the longitudinal axis of the specimen at right angles to the rollers. The load shall be applied at a rate of loading of 400 kg/min for the 15.0 cm specimens and at a rate of 180 kg/min for the 10.0 cm specimens

6, RESULTS AND DISCUSSION

Table 2

Fresh concrete test results

NO.OF	PERCENTAGE	FLOW

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TRIALS	OF WATER	TABLE(FLOW)
1.	17.0%	250mm
2.	15.0%	207mm

Table 3

Workability test

Weight of the mortar taken		800g
Weight of the water		120g
Trail 1	17.0% of water	250mm => 130g (water)
Trail 2	15.0% of water	207mm => 120g (water)
Flow value		15.0% of water (207mm)

7, APPLICATION OF TRANSPARENCY CONCRETE

7.1 Illuminate Your Walls

Transparent Concrete can be used as building material for interior and exterior walls. If sunshine illuminates the wall structure, then eastern or western placement is recommended; the rays of the rising or setting sun will hit the optical glass fibers in a lower angle and the intensity of the light will be bigger. Besides the traditional applications of a wall, the light transmitting concrete can also be used as wall covering illuminated from the back.

7.2 Watch Your Pavement Shine at Sunset

This concrete can be used as flooring a passable surface illuminated from below. During the day it looks like typical concrete pavement but at sunset the paving blocks begin to shine and in different colors.

7.3 Get Creative with Design

The building units are versatile and can be used in many areas of design. Two successful designs using the light transmitting concrete were a jewel and a concrete bench. You can also create a logo with colorful figures, inscriptions, and pictures and can used for beautification purpose.

8, CONCLUSION

The efficiency of the application of optical fiber is studied by comparing the strength with the normal M20 grade concrete and the test results proved that the efficiency is more in all aspect. Even if initial cost of the light transmitting concrete is more than conventional concrete by 12 time. This new kind of building material can integrate the concept of green energy saving with the usage self-sensing properties of functional materials. The main advantage of transparency concrete is reducing the self-weight of the structure. Hence the light transmitting concrete has high strength while comparing with conventional concrete

REFERENCES

#1.ZHI ZHOU et al (2006), He reported that the light guiding performance of concrete materials is completely determined by the internal POFs area ratio and the surface roughness in certain sections. POF based transparent concrete could be regarded as an art which could be used in museums and specific exhibitions rather than just a construction material.

#2.B.He et al. (2011), He published a study on smart TC, which experimentally explored the light emission properties of TC in the laboratory. Building on his research, this study took a step further by modeling light transmission and studying heating rate of the TC panel when exposed to sunlight throughout the year. Interestingly, development of light-transmitting facades is gaining more interest.

#3.C.BASMA F. BASHBASH et al (2013)He discussed about the development of a light transmitting concrete using plastic optical fiber, which will help to reduce the consumption of electric energy. They concluded that an optical fiber can be easily combined with concrete and that the POF could provide a steady light transmitting ratio.

#5.SHANGHAI CHINA (WORLD EXPO 2010), Italy modeled its pavilion out of TC using approximately 4,000 blocks. The blocks were rather heavy to be used as a facade subsystem in buildings. Another product featured plastic fibers arranged in a grid, namely Pixel Panels, developed by Bill Price of the University of Houston. These panels transmitted light in a pattern resembling thousands of tiny stars in the night sky. University of Detroit Mercy also developed a process to produce translucent panels made of Portland cement and sand and reinforced it with a small amount of chopped fiberglass. These panels,

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which were only 2.5 mm thick at their centers, were thin enough to be translucent under direct light.

BIOGRAPHY

Authors have the option to publish a biography together with the paper, with the academic qualification, past and present positions, research interests, awards, etc. This increases the profile of the authors and is well received by international readers

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