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The Light Transmitting Concrete by using Optic Fiber

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Abstract :- Transmitting concrete is produced out of fine-grain concrete and transmitting fabric which is layer cast in prefabricated moulds. Because of relatively small amount of fabric, solidity and consistency of transparent concrete are the same as by the high-strength concretes. Energy saving and safety evaluation are two key issues for infrastructure. An optical fiber can be easily combined with concrete and that the POF could provide a steady light transmitting ratio. Moreover, the FBG can be used as a sensing element for strain and temperature. Because the smart transparent concrete can be regarded as a "green" energy saving construction material and as a smart intrinsic sensor for long-term Structural Health Monitoring (SHM), it is a promising technology for field applications in civil infrastructure.

I. INTRODUCTION

Due to economic development and space utilization requirements, high rise buildings and Skyscrapers are mostly built downtown in metropolitan areas around the world, especially those countries with great populations. Those buildings are isolated biosphere only based on man-made lights to maintain people's optical activities. For example, China consumes 25% of global architectural energy and 13% of that energy is used to power lighting.

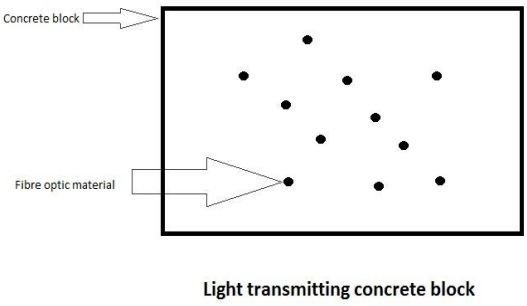

Fig 1. Light Transmitting concrete Block

At present, green structures focus greatly on saving energy with indoor thermal systems. However, in the area of illumination fields, there is very little research offering relevant solutions. Research on the intrinsic characteristics of the optical identity in construction materials is still at its infancy. Due to its outstanding light guiding and sensing advantages, such as anti-electromagnetic interference capability, small dimensions, distributed measurement and anti-corrosion characteristics, optical fibers have been widely adopted in the communication and sensing fields. It is considered to be one of the best sensor materials available and has been used widely since the 1990s. Hungarian architect, Aron Losonczi, first introduced the idea of light transmitting concrete in 2001 and then successfully produced the first transparent concrete block in 2003, named LiTraCon, research and experimentation provides solid evidence for the intelligence of this system in structural safety assessment. With regard to the energy-saving aspect, POF-based concrete allows the use of sunlight for illumination; in the case of emergencies, transparent concrete will provide some relief in the case of daytime power outage for skyscrapers, making evacuation safer and more efficient. Additionally, a smart transparent concrete is aesthetically pleasing. 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. Transmitting concrete is an intriguing building material. It combines stability of concrete with translucency. This may seem like an impossible combination, however it has been achieved. The most interesting aspect of this material is the sharp shadows cast onto and through the block or wall. The fibre glass in the concrete transmits light through the width of block, therefore making it transmitting .the foll.post will include a brief history of transmitting concrete, its composition and its properties. Transmitting concrete is also refered to as "Light Transmitting Concrete ",as it allows both natural and artificial light to pass through it.It was invited by Aron Losonczi,a Hungarian architect. Losonczi added fibre optic material to the traditional concrete mix. The result was named Litracon. Since its creation litracon has been used in several construction projects, revolutionizing the way architect approach construction.

II. ADVANTAGES

1. It has very good architectural properties for giving good aesthetical view to the building.
2. Totally environment friendly because of it is light transmitting characteristic. And it is requirement for green buildings.
3. Energy saving can be done by utilization of transparent concrete in building.
4. Blocks work as heat insulator so they will be very effective in cold counties.
5. It is stronger and possesses almost same characteristic strength of normal concrete blocks therefore it is better replacement to it.

III. APPLICATION

1. Transmitting concrete inserts on front doors of homes, allowing the resident to see when there is a person standing outside.
2. Transmitting concrete walls on restaurants, clubs, and other establishments to reveal how many patrons are inside.

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3. Ceilings of any large office building or commercial structure incorporating transmitting concrete would reduce lighting costs during daylight hours.
4. Lane markers in roadways could incorporate various colours in the transmitting concrete, allowing for dynamic adjustments when required by traffic fluctuations.
5. Sidewalks poured with transmitting concrete could be made with lighting underneath, creating lit walkways which would enhance safety, and also encourage foot travel where previously avoided at night.
6. The use of transmitting concrete in an outer wall of an indoor stairwell would provide illumination in a power outage, resulting in enhanced safety.
7. Subways using this material could be illuminated with daylight.

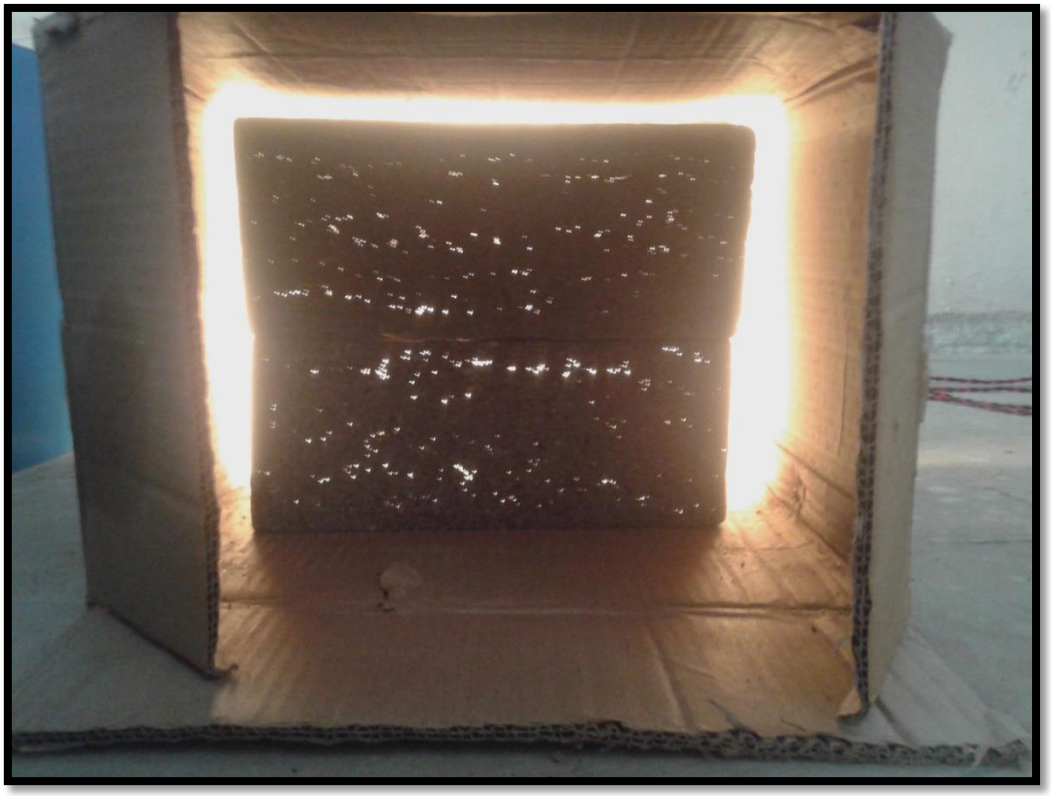

Fig 2.

Fig 3.

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IV. LIMITATIONS

1. No chemical is used for cleaning.
2. Not applicable for main walls.
3. Plaster is Not Necessary.

V. CONCLUSION

1. Transparent concrete can be developed by adding optical fibre or large diameter glass fibre in the concrete mixture.
2. 2. It has good light guiding property and the ratio of optical fibre volume to concrete is proportionate to transmission of light.
3. 3. It doesn't lose the strength parameter when compared to regular concrete and also it has very virtual property from the aesthetic point of view.
4. 3. This new kind of building material can integrate the concept of green energy saving.

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