

REVIEW ON LIGHT EMITTING CONCRETE

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Abstract: 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. Based on the excellent properties of light guiding and elasto-optic effect of optical fiber, a novel smart transparent concrete can be made.

I. INTRODUCTION

Light emitting concrete or transparent concrete or Translucent concrete or light-transmitting concrete is a concrete based building material with light-transmissive properties due to embedded light optical elements usually Optical fibers. Light is conducted through the stone/hole from one end to the other. Therefore the fibers have to go through the whole object. Transparent concrete is also known as the translucent concrete and light transmitting concrete because of its properties. It is used in fine architecture as a facade material and for cladding of interior walls. The main purpose is to use sunlight as a light source to reduce the power consumption of illumination and to use the optical fiber to sense the stress of structures and also use this concrete as an architectural purpose for good aesthetical view of the building.

OPTICAL FIBRE

Optical fiber is a transparent, flexible fiber slightly thicker than a human hair made of plastic or glass (silica).

ADVANTAGES

- It has very good architectural properties for giving good aesthetical view to the building.
- When a solid wall is imbued with the ability to transmit light, it means that a home can use fewer lights in their house during daylight hours.
- Energy saving can be done by utilization of transparent concrete in building.
- Totally environment friendly because of its light transmitting characteristics, so energy consumption can be reduced. And it is requirement for green buildings.
- Blocks work as heat insulator which can be adopted in cold countries.

DISADVANTAGES:

- It is precision material and the correct procedure need to be followed.
- It is extremely important to ensure the integrity of optic strands if they break within the product property would almost be neglected.

- Costing of this material is difficult as the techniques are just start to develop.
- Casting of transparent concrete block is difficult for the labour so special skilled person is required.

APPLICATION

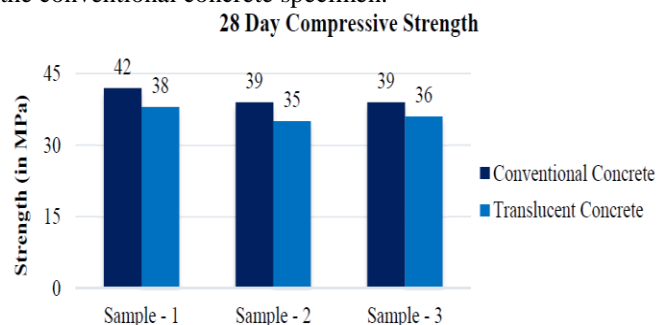
- Light Transmitting Concrete can be used for interior and exterior walls.
- Facades, interior wall cladding and dividing walls based on thin panels.
- Increasing visibility in dark subway stations
- In furniture for the decorative and aesthetic purpose & Light sidewalks at night
- Lighting fixture & Transmitting concrete walls of restaurants, clubs, and other establishments to reveal how many Customers are inside.

FUTURE SCOPE

As every nation is looking towards better, strong, beautiful building materials and are facing problems of energy crisis. Using translucent concrete helps us to save about 25% of electrical energy during days. Being better looking helps in reduction of plastering charges. As it is transparent helps in improving security as we can nearly see through them. Being strong means better strength, better load carrying capacity.

Amlan Kumar Sahoo, Sachin Sahu, Aman Kumar Singhal, Kuramana Stephen, Tamo Talom, Subham Saroj Tripathy, Sidhant Das,(2017), "Experimental Study of Light Transmitting Concrete Using Optical Fiber".

In their experimental study on concrete specimen they did tests like compressive strength test and light transmission test. The compressive strength results obtained for the translucent concrete specimens were almost same as that of the conventional concrete specimen.



Author conclude that with the advancement of technology, our infrastructures should be modified. For sustainable development, we have to emphasize the use of renewable energy sources to meet the growing demand for energy. All

the above concerns can be solved by Translucent Concrete, a novel architectural material. It has the potential to usher all the above concerns if it can be used on a large scale, and which would be realized if the existing shaping technique gets advanced.

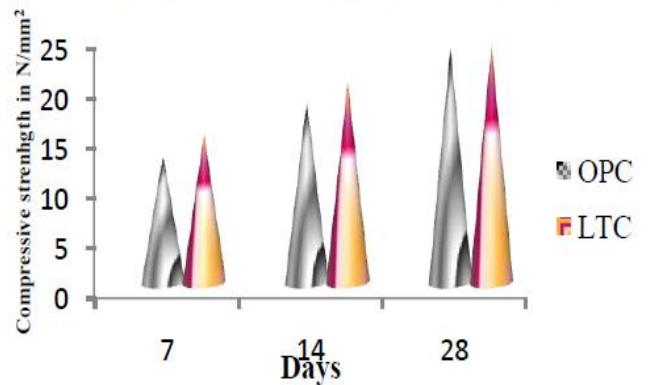
Abhishek Pathade, Karthik Nair, Nishad Tharwal, Ravi Tiwarekar,(2016) "LIGHT TRANSMITTING CONCRETE" This paper conclude that The Light Transmitting concrete do not loses strength parameter when compared to regular concrete. It has good light transmitting property and the ratio of optical fibre volume to concrete is proportion to transmission. It has very vital property for the aesthetic point of view. It can be used for the best architectural appearance of the building. Also used where the light cannot reach with appropriate intensity. Optical fibre also acts as reinforcement for the concrete.

Patil Gaurao S., Patil Swapnal V.(2015) "Light Transmitting Concrete- A New Innovation" In this paper they gave detail characteristic of transmitting concrete, advantage and disadvantage of transmitting concrete. In characteristics they cover resistance to compression, water absorption, maximum oxygen index, thermal conductivity, elastic limit, Young's Modulus. 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. Although ease of construction is to be compromised, the material is bound to be accepted universally due to its advantages. With the concept of green technology catching up, electrical supply, being supplemented by natural sources, it becomes absolutely necessary to utilize the natural resource. Although Litracon has yet to be made available for commercial use, it has already been suggested that buildings made with the material could save electricity that would otherwise be required for daytime lighting. When light transmitting properties were examined, the test results have revealed that the produced concrete can be cut into different shapes without losing its transparent property and it can be used as architectural concrete on roofs of special buildings. Moreover, this light transmitting concrete can be utilized in the production of special types of home furniture.

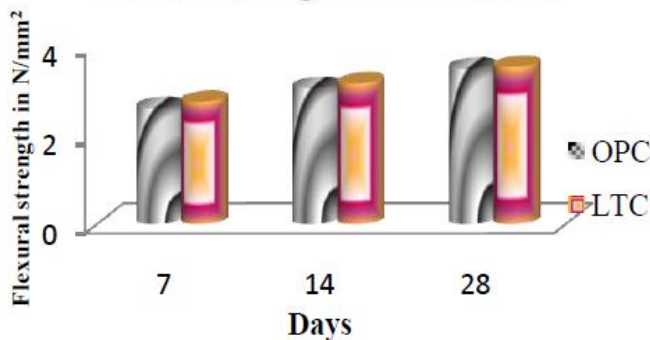
P.M.Shanmugavadivu, V. Scinduja, T.Sarathivelan, C.V Shudesamithronn,(2014)," AN EXPERIMENTAL STUDY ON LIGHT TRANSMITTING CONCRETE " the paper said The workability of the concrete is determined by conducting the slump cone test and the observed slump is 92mm. The strength results of decorative concrete are correlated with results of ordinary plain cement concrete. The results evidently show that the decorative concrete also performance based on the strength aspect is also considerably high. Hence the application of optical fiber will make the concrete decorative as well as can make the concrete structural efficient. This paper conclude 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.

- The fibers can be used in concrete for decorative purpose.
- The major purpose of light transmitting concrete is created as a model and the light transmission is made of the illuminating side of the concrete.
- This decorative concrete can be used in interior design of buildings as panels in slabs, walls etc.
- Hence the application of optical fiber will make the concrete decorative as well as can make the concrete structural efficient.

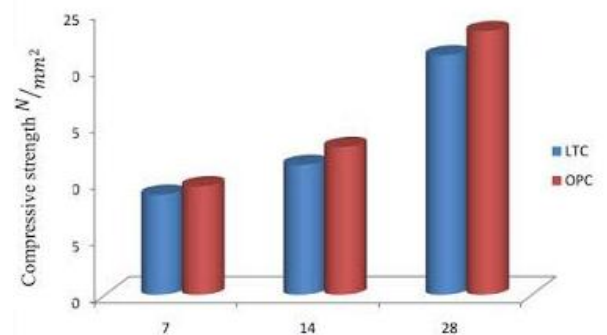
Compressive strength of the concrete

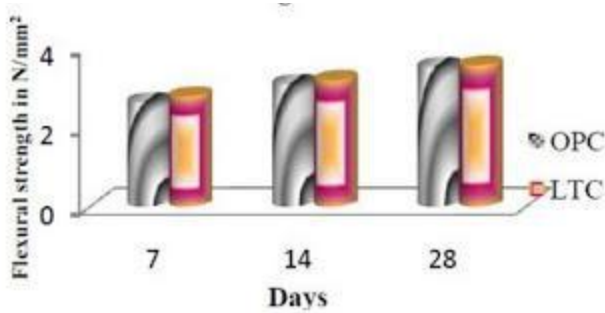


Flexural strength of the concrete



Seminar on www.studymafia.org says that The transparent concrete has good light guiding property and the ratio of optical fiber volume to concrete is proportional to transmission. The transparent concrete does not loose the strength parameter when compared to regular concrete and also it has very vital property for the aesthetical point of view. It can be used for the best architectural appearance of the building. It can also be used in areas, where the natural light cannot reach with appropriate intensity.





II. CONCLUSION

Concrete is no longer the heavy, cold and grey material of the past; it has become beautiful and lively. By research and innovation, newly developed concrete has been created which is more resistant, lighter, white or colored, etc. Concrete has learned to adapt to almost all new challenges that Luxemburg appeared. A novel architectural material called transparent concrete can be developed by adding optical fibre or large diameter glass fibre in the concrete mixture. The transparent concrete has good light guiding property and the ratio of optical fibre volume to concrete is proportion to transmission. The transparent concrete not loses the strength parameter when compared to regular concrete and also it has very vital property for the aesthetical point of view. It can be used for the best architectural appearance of the building. Also used where the light cannot reach with appropriate intensity. This new kind of building material can integrate the concept of green energy saving with the usage self-sensing properties of functional materials.

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