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Experimental Study on Translucent Concrete Blocks

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Abstract:

Translucent concrete is also known as a Light emitting concrete is the new type of concrete introduced in modern era which carries special property of light transmitting due to presence of plastic tubes It is lighter than conventional concrete having special features such as low density and thermal conductivity with main advantage of reduction in dead weight, faster building rate in construction, lower haulage & handling cost. Light is transmitted from one surface of the brick wall to the other due to plastic tubes along the overall width of the wall which allows light to pass through. From the study, it can be concluded that there is 5% to 10% increase in initial compressive strength for 7 days & also 10% to 15% increase in initial compressive strength for 28 days to a plastic tubes mix of up to 3% Whereas the initial & final characteristic compressive strength gradually decreases with an increase in glass tubes in the concrete mix.

Keywords: Concrete, Blocks, Light emitting , Compression testing Machine

INTRODUCTION

Concrete has made considerable progress, not only in technical terms, but also in aesthetic terms. It 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 stronger, lighter, white or coloured, etc. Concrete has learned to adapt to almost all new challenges that appeared. Now a day there is drastic improvement in construction technology, the height of building is increased to great extent. Metropolitan cities are crowded by sky skyscrapers which in turn increase artificial light consumption for illumination and hence to reduce power consumption, light transmitting concrete is better alternative. Transparent concrete is a concrete based building material with light transmitting properties due to embedded light optical elements usually fibres. Light is conducted through the

The purpose is to derive sunlight in interior of structure as a light source to reduce the power consumption for illumination and also use this concrete as an architectural purpose for good aesthetical view of the building as well as for interior decoration. Basic objective is to preparing light transmitting concrete and making it light weight as well as self compacting using lighter material and admixtures. In 2001, the concept of transparent concrete is first put forward by Hungarian architect Aron Losonzi, and the first transparent concrete block is successfully produced by mixing large amount of glass fibre into concrete in 2003, named as LiTraCon. Joel S. and Sergio O.G. developed a transparent concrete material, which can allow 80% light through and only 30%

of weight of common concrete. It is worth mentioning that Italian Pavilion in Shanghai Expo 2010 shows a kind of transparent concrete developed by mixing glass into concrete in 2010. While the transparent concrete mainly focuses on transparency and its objective of application pertains to green technology and artistic finish. . The largest project exhibiting this technology is an artistic installation, called the 'European Gate' which was designed to mark the celebration of Hungary joining the European Union (EU). Located at the public entrance of Fortress Monoester in the Hungarian town of Komarom, this is one of the most impressive pieces of art conjugating visual lighting display as well as artistic using translucent concrete.

Following are the objectives

1. To make concrete partly transparent by using plastic tubes, to impart good appearance to structure.
2. To study improvement in performance of concrete in light transmission by using plastic tubes and improve performance of structure to derive natural light.
3. To study Energy saving for illumination by using transparent block for building.
4. To study cost effectiveness of this high-performance concrete.

Methodology:
Preparation of moulds for Light Transmitting Concrete.
In this step wooden moulds of size 150mm X 150mm X 150mm as shown in (Fig.2) are prepared by applying the oil on the inner sides of the cubes so that moulds can be removed easily after concrete is set

Concreting.
The third step is the process of pouring of the concrete in the cubes. This process should be carefully done so that plastic tubes are not damaged. This process should be carried out in layers so that proper compaction is done and there are not any gapes inside the concrete cube.

Removing of mould
The fourth step is the process of removing the cubes from the moulds. This is done 24hrs after the process of concreting. Care should be taken not to break the cubes while taking them out of the moulds.
Cutting and Polishing

The 5th step is the process of cutting and polishing. of extra pipe on both sides and polished sides of cube.

Curing

Curing of concrete is a method by which the concrete is protected against loss of moisture required for hydration and kept within the recommended temperature range. Curing will increase the strength and decrease the permeability of hardened concrete. Curing of cubes was done for 7,14 and 28 days

RESULTS AND DISCUSSION

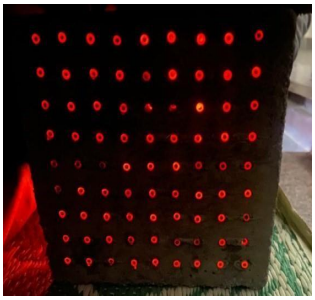
Compressive Strength of conventional concrete.

Number of days of curing	Load applied (KN)	Compressive strength in N/mm2
7	366	16.25
14	506	22.25
28	563	25

Compressive Strength of light transmitting concrete

Number of days of curing	Load applied (KN)	Compressive strength in N/mm2
7	390	17.35
14	533	23.7
28	603	26.8

C/S Area in mm2 of 150mmX150mm cubes is 22500mm^2



DISCUSSION

Although translucent concrete has been used primarily as an interior decoration, its creators have "visions of cities that glow from within, and buildings whose windows need not be flat, rectangular panes, but can be arbitrary regions of transparency within flowing, curving walls. It "Translucent concrete is also a great insulating material that protects against outdoor extreme temperatures while also letting in daylight his makes it an excellent compromise for buildings in harsh climates, where it can shut out heat or cold without shutting the building off from daylight.

It can be used to illuminate underground buildings and structures, such as subway stations. Translucent concrete could provide safety applications in the future such as speed bumps that could be lit "from below to make them more visible at night", or to light indoor fire escapes in case of a power failure. It even has the potential to be sustainable; the aggregate can be replaced with crushed recycled glass. The possibilities for

translucent concrete are innumerable; the more it is used, the newer uses will be discovered. In the next few years, as engineers further explore this exciting new material, it is sure to be employed in a variety of interesting ways that will change the opacity of architecture as we know it.

CONCLUSION

Transparent concrete is aesthetically pleasing. Optical pipes based transparent concrete could be regarded as an art which could be used in museums and specific exhibitions rather than just 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 necessary to utilize the natural resource.

Although litracen 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. Moreover, this light transmitting concrete can be utilized in the production of special types of home furniture. In future, the cost of light transmitting concrete is expected to decrease with the advancement in technology, manufacturers and as well as the users. Translucent concrete is the future. It is the smart way of optimizing and utilizing light, a smart way of living.

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