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TRANSPARENT CONCRETE AS A GREEN MATERIAL FOR BULDING CONSTRUCTION

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ABSTRACT

With the economic process and science-technology development, a lot of and a lot of large-scale engineering structures. Whereas the economicprocess may be a reasonably in depth growth: high input, high consumption and high pollution, for that the energy saving technology is low, particularly in developing countries. The brightness of indoor setting is entirely maintained by artificial lighting, that has consumed an oversized variety of resources. Furthermore engineering structures perpetually suffer from external environmental effects, economic loss and casualties square measure serious once broken. And now, building energy saving and building safety are attracted abundant attention so it's imperative to develop a brand new useful material to satisfy the structure safety watching, environmental protection and energy saving and inventive modeling Transparent concrete may be a concrete primarily based artifact with lightweight-trans missive properties thanks to embedded light optical parts sometimes optical fibres. Lightweight is conducted through the stone from one finish to the opposite. so the fibres need to undergo the total object. This results into an explicit lightweight pattern on the opposite surface, betting on the fibre structure. Where as the clearconcrete principally focuses on "transparent" and its application object is art style. Semitransparent concrete will be thought of one among the foremost stunning, noble and mysterious product innovations within the last years.. TC may be acombination of recent concrete and embedded fibre optic cables. Fibre upon fibre lightweight is projected through the development part – as an example pictures on the far {side} a wall seem purpose wise or digitized on the other side, regardless if they're shadows, light, colors, projections or displays.

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INTRODUCTION

With the economic growth and science-technology development, more and more large-scale civil engineering structures such as tall buildings, underground buildings and landmark buildings and so on are built around the world. The brightness of indoor environment is entirely maintained by artificial lighting, which has consumed a large number of resources. Moreover civil engineering structures always suffer from external environmental effects, economic loss and casualties are serious once damaged. And now, building energy saving and building safety have been attracted much attention. Many large span bridges and new landmark buildings have been successfully implemented structural health monitoring systems.

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Meanwhile some new building materials are developed and used in structures, including self-diagnosis smart concrete, self-tuning smart concrete, self- repairing smart concrete, soundproof concrete, thermal insulation concrete. Translucent concrete (also: light-transmitting concrete) is a concrete based building material with light-trans missive properties due to embedded light optical elements usually optical fibers. Light is conducted through the stone from one end to the other. Therefore the fibres have to go through the whole object. This results into a certain light pattern on the other surface, depending on the fibre structure.

LITERATURE REVIEW

Nikhil K: Studies on producing the concrete specimen by reinforcing optical fibers with different percentage and comparing it with the normal concrete. The various test conducted for this are compressive strength test and light

transmission test, and he concluded that the transparent concrete strength is same as to ordinary concrete and gives good aesthetic view.

Abhishek Pathade: Investigated to develop the building aesthetic in modern construction and consumption of energy with eco-friendly way. 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 this concrete as an architectural purpose for good aesthetical view of the building. Investigated to develop the building aesthetic in modern construction and consumption of energy with eco-friendly way. 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 this concrete as an architectural purpose for good aesthetical view of the building. He conclude that the not loses the strength parameter when compared to regular concrete.

MATERIALS AND METHODS

In this transparent concrete the various raw materials are used like cement, sand, coarse aggregates and optical fibre. The ordinary Portland cement is used. Crushed sand is used for concreting.

CHRYSO Optima K9320

Is a new generation super plasticizer based on POLYCARBOXYLIC ETHER. It allows concrete to achieve targeted workability, while reducing water / cement ratio. It is developed to maintain fresh concrete workability without compromising setting time. CHRYSO Optima K9320 is especially adapted for Ready Mix Concrete as well as job site application which require early and long term strengths. Thanks to specifically designed molecular structure of CHRYSO Optima K9320 which offers workability retention without use of slump retainer. This also enables the concrete manufacturer to produce cohesive, low viscous concrete with desired workability retention. Thereby green concrete can be hauled for longer (if required) distances and still be placed conveniently around congested reinforcement. It reduces thixotropy of the mix without risk of segregation. Optimum dosage can only be established after trials, taking into account the rheological characteristics and the required mechanical performances. Rate of addition is generally in the range of 0.5-2.0% by weight of cementatious material. For maximum dispersion throughout the mix, CHRYSO Optima K9320 should be added to the mixing water only. Should the product be added to fresh concrete, high speed, and then at low speed (with a minimum 3 minutes at each.

Mix Design

For the testing purpose M25 grade of concrete is designed by IS method.

- Type of cement - OPC 53 grade
- Maximum nominal size of aggregate - 10mm
- Maximum water-cement ratio - 0.50
- Workability - Good
- Exposure condition - Moderate

Fig. 1. Wooden Mould

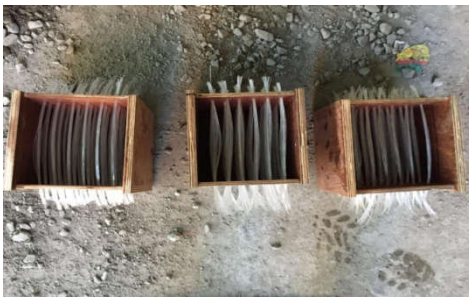

Fig. 2. Mould with optical fibres

Fig. 3. Trimmed specimen

Fig. 4. Curing of Specimen

Procedure of casting a transparent concrete cubes

- Prepare of wooden mould of inner dimension (15x15x15 cm)
- Clean the mould and oiling should done

- Pass the cables from holes
- Prepare the concrete and place in to the mould in which cables i.e optical fibers are already fixed
- Remove the mould next day
- Allow the cubes for curing
- Trim and polish the block using grinder for aesthetically good appearance, marking over it by paint

Table 1. Compressive strength at 7 days

Sr No	Type of cube	Age of cube (days)	Mass in Kg	Compressive strength (Mpa)	Avg compressive strength
1	TC	7	9.22	16	16.25
2	TC	7	9.219	16.5	
3	NC	7	9.274	16.2	16.6
4	NC	7	9.3	17	

Table 2. Compressive strength at 28 days

Sr No.	Type of cube	Age of cube (days)	Mass in Kg	Compressive strength(Mpa)	Avg compressive strength
1	TC	28	9.217	24.2	24.55
2	TC	28	9.263	24.9	
3	NC	28	9.4	25	24.95
4	NC	28	9.3	24.9	

TEST RESULTS

After curing compressive test was conducted on specimen of TC and NC at the age of 7days curing and 28 days curing. The results are as below:

Light Transmission Test results

For the light transmission test lamp, bulb, Amp meter and Photodiode are required

Connect the given instrument in proper series

Switch on the input source (i.e Lamp/Bulb)

The photo diode then converts the light energy into electrical energy which is passed through transparent concrete specimen Note down the Reading from the amp meter display

Result

Input of light energy from the source = 25.4 A

Output of electrical energy = 3.1 A Therefore Light transfer efficiency of NC= (output/Input)*100 (0/25.4)*100
= 0%

Light transfer efficiency of TC= (output/Input)*100
(3.1/25.4)*100
= 12.20%

Conclusion

- The transparent concrete has good light transpiring property and the ratio of optical fibre volume to concrete is proportion to transmission.
- 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 light cannot be reached.
- The compressive strength of NC is more than TC

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