EVALUATE THE OUTCOME OF THE STRENGTH AND ECONOMICAL ELEMENTS IN TRANSPARENT CONCRETE

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Abstract - *Concrete is a composite material made out of fine and coarse total reinforced together with a bond glue which solidifies after some time. With the financial development and an expansion in the populace, it made a need to give numerous structures inside a littler piece of land which prompt the advancement of the idea of high rises. These high rises confront an issue of common enlightenment and relies upon manufactured light, thus leading to the development of transparent concrete. The idea of transparent concrete was instituted in 2001 by Hungarian planner, Aron Losonzi. In 2003, he effectively delivered first transparent concrete block by adding 4% to 5% of glass fiber (by volume) into concrete and found out that it can transmit light up to 50 feet. This was a revolutionary idea in the green building industry as it helped in resolving the issue of enlightenment using the naturally available light. Although it was a fantastic breakthrough but it was not a affordable one as it used the glass optical fibers in it. Earlier developed transparent concrete have achieved a strength of about 22-23 kn/m2 but we are trying to increase the strength parameters to about 25-30 kn/m2. So in this paper the work on economical and strength aspects of the transparent concrete is done that is increasing the strength but also decreasing the cost.*

Keywords: *Light transmitting concrete, Optical fiber, Transparent concrete*

- **INTRODUCTION**

With the time advancing there have been a great increase in the population and thus came the requirement of places to live but the space is limited. There we came up with the idea of making high rise building apartments so as to utilize the space available. With the rise in number of high rise building and skyscrapers we generated the requirement of artificial lightening. As in the case of china, it uses 25% global architectural energy and 13% of that is used for lightening purpose. So here came the Transparent Concrete which is a newly developed green building material, which uses the sunlight for the illumination purpose in buildings. Aron Losonzi, a Hungarian architect first came up with the concept of transparent concrete in the year 2001 and in 2003 he came up with LiTraCon ("light transmitting concrete") which was the first successfully produced transparent concrete block. LiTraCon is a translucent building material which is made up of 5% by weight optical fiber in fine concrete
in which the optical fibers are laid in a strategical way between the two main surfaces of the block of concrete. This idea was a revolutionary one as it was reaping the earlier image of concrete that is a grey, heavy and cold material and transforming the idea of concrete into a more of aesthetical material. This idea was also comprehending the recent trends in world about making everything energy efficient and save as much energy as we can .

1. LITERATURE REVIEW

A. akshaya b.kamdi, issn 2319 – 6009 www.ijscer.com, vol. 2, no. 3, august 2013, "transparent concrete as a green material for building", studied that transparent concrete holds a great number of opportunities in the coming future and how it was made. Conclusion is that the transparent concrete breaks the idea of conventional concrete and it's a great green building material.

B. Neha R. Nagdive and Shekhar D.Bhole (2013) ISSN(E): 2321-8843; ISSN(P): 2347-4599 Vol. 1, Issue 7, Dec 2013, 23-30, "To Evaluate Properties of Translucent Concrete/Mortar and Their Panels", To fabricate the transparent concrete using optical fiber and assess the panel for the illumination properties of optical fiber by drilling through the concrete. In conclusion it was found that smart transparent concrete have adequate illumination properties.

C. Jianping He et al (2011), "Study on Smart Transparent Concrete Product and Its Performances", proceedings of The 6th International Workshop on Advanced Smart Materials and Smart Structures Technology ANCRiSST2011 July 25-26, 2011, Dalian, China, studied that the marvelous characteristics of optical fiber in light guidance and elasto-optic effect. They concluded that POF volume ratio effects the amount of light transmission in smart transparent concrete. The compressive strength of the transparent concrete is directly proportional to the quantity of plastic optical fiber. The POFs have decreased impermeability of the concrete.

D. M.N.V.Padma Bhushan (2013), "Optical Fibres in the Modelling of Translucent Concrete Blocks",ISSN:22489622www.ijera.com,Vol.3, Issue-3,May-Jun-2013, pp.013-017(2013),studied that the translucent concrete is a material which gains its light transmissive characteristics from the infused light optical material like Optical fibers with concrete as its base. In conclusion the translucent concrete is a material with various application with the only con of its high cost.

E. B. Sawant (2014), "Light Transmitting Concrete by using Optical Fibre", International Journal of Inventive Engineering and Sciences (IJIES),ISSN: 2319–9598, Volume-3 Issue-1, December 2014, As the requirement of living space is increasing day by day we have shifted towards high rise buildings and skyscrapers instead of the small buildings. With so many high rise buildings made near to each other have led to the unavailability of natural light to every building. Thus the illumination problem raised is being handled by the artificial source of illuminations. So as to decrease the man-made light consumption in a building we can use the light transmitting concrete. In the end they concluded that the light transmitting concrete have adequate compressive strength , illumination and effectiveness of cost.

2. SIGNIFICANCE OF THE STUDY

It is used for aesthetic view of decorating the concrete. It is more economical then glass fiber. It transmit the light continuously due to this in day time more energy will be saved where more infrastructure are built in small areas. It gives higher compressive strength (26to 28 kn/m^2) as compared to previous research and it is also a green material.

3. EXPERIMENTAL WORK

a. Materials Used

Ordinary Portland cement, Natural sand of zone II and Plastic optical fiber, Coarse aggregate (6mm-10mm) The diameter of the fiber is used as easily available in market.

b. Mix Proportions

Mix proportions are arrived as follows: Cement – 462.22kg, Sand – 905.54kg, Coarse aggregate - 870 Kg Fiber – 3.5kg, Water – 176.79lit, Admixture (superplasticizers) - 4.622kg

c. Placing of Fibres and Casting the Concrete

We use 150mm×150mm×150mm mould for simple and Trans missive concrete blocks. For Transmissivity blocks, our team prepares a cardboard sheet with many number of holes and place them in concrete block mould

STEP: 1

Cut the cardboard in 150mm× 150mm size.

STEP: 2

Drill the cardboard with number of holes.

STEP: 3

Insert plastic optical fibre in cardboard and placed them in bottom of concrete mould.

STEP: 4

Prepare concrete mix with 6 to 10mm coarse aggregate as specified in above mixed proportion.

STEP: 5

Fill concrete mix in mould completely and put mould on vibrator.

STEP: 6

Leave that mould for 24hrs**.** then open the mould and keep in water for 28 days.

FIGURES

A) Concrete block mould.

B) Super plastisizer

C) Transmission of light

4. Workability

Workability is the measure of vitality to defeat Friction while compacting. Likewise characterized as the relative straightforwardness with which cement can be blended, transported, formed and compacted. Workability is determined with the help of slump cone test.

5. Compressive Strength

Compressive strength of material is that estimation when material flops totally during gradually applied load. The compressive quality of material generally acquires tentatively by method of a compressive strength test. The compressive strength of concrete is generally determined by cast of cubes of 150mm×150mm×150mm.

Compressive strength = load/area [eq.1]

6. Flexural strength

Flexural quality is an estimation that shows a material's protection from distorting when it is put under a heap. The qualities expected to compute flexural quality are estimated by experimentation, with rectangular examples of the material put under load in a 3 - or 4 -point testing setup.

Flexural strength = Pl/bd^2 [eq.2]

Where, P – Load, l – Length of the specimen, b - width of the prism, d – depth of the prism

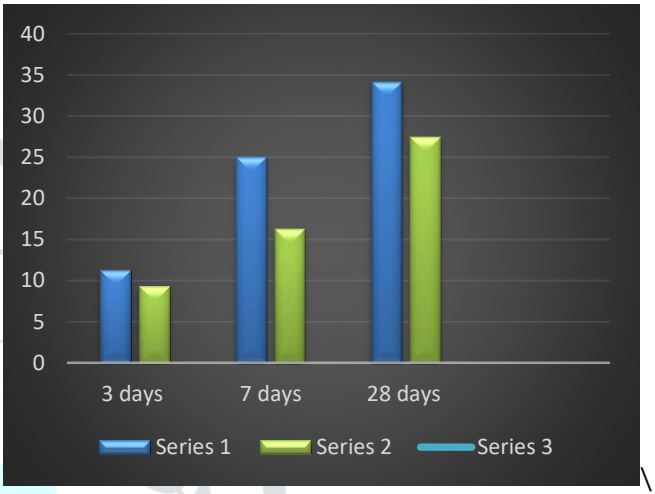
7. RESULTS AND DISCUSSIONS

6.1 Workability

We worked on pumpable and normal concrete both. The workablity is determined by slump cone test and the workability for pumpable concrete is kept 100mm and for norman concrete it was kept as 50mm respectevly, But we found the slump cone values as respectively 96mm and 47mm.

6.2 Compressive Strength

Compressive strength of concrete as we found are mentioned below in table.



8. CONCLUSIONS

- Strength of light transmissive concrete is compared with M-35 Norman concrete and it is found that it gives strength more than 25N/mm^2. This is sufficient to use in general construction to save the electric energy.
- This type of concrete will also use for asthetic purpose.
- The decorative concrete will used as various way like interior designing, exterior designing etc.
- This is also a green material which is useful for us to protect environment.
- This is much economical than previous glass optical fibre and also gives better result than previous.
- More than 4% of plastic optical fibre may cause of reduction in compressive strength
- This will use as structural component of any building or structure.

9. REFRENCES:

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