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Life Cycle Cost Analysis of Translucent Concrete

Nadeem Gulzar Shahmir, Manzoor Ahmad Tantray

Abstract*: Translucent concrete permits the daylight specifically to go starting with one of its end then onto the next end. This is to be finished by embedding plastic optical filaments in concrete which is chiefly utilized for correspondence reason and the optical strands take a shot at the premise of Nano optics; in this paper cost examination on execution of translucent concrete in room (translucent concrete room) is talked about. The examination depends on the estimations and analyses, computations are done on the suppositions that plastic optical filaments of 2mm width are utilized in the room having specific measurements. By using these plastic optical filaments in concrete was checked for the expense as well as checked for the light force going crosswise over casted concrete blocks. Lux meter was utilized for estimating power of light and sizes of (150mm x 150mm) (22500mm sq. surface zone) with thickness of 75mm solid 3D shapes was cast to check the outcomes. By utilizing translucent concrete in room won't just keep up the quality of the room yet will likewise enable the light to go into the room bringing about immense measure of vitality sparing and giving different advantages of daylight. Base on the presumptions of utilizing these casted cuboids in the room the last expense of the room was determined and was contrasted with the expense of regular room and last outcomes rely upon the measure of vitality that gets spared by utilizing translucent concrete in room and different advantages of utilizing translucent concrete in room and it was found to be economical and energy efficient source to utilize translucent concrete in rooms or buildings.

***Index Terms*: Translucent solid, plastic optical filaments, lux meter, daylight, vitality sparing, concrete samples, translucent concrete room..**

I. INTRODUCTION

Translucent concrete (Fig 1) is moderately another material in structural designing which specifically enables the light to go through it. It permits the counterfeit as well as characteristic light to go through it. Daylight is essential in our everyday life as the light inside a room can represent the moment of truth comfort level inside our room. Other than daylight has a ton of critical advantages like it is a rich wellspring of nutrient D, it is utilized to fix SAD, ensures against low pulse, supportive for muscles, enhances working of mind and can likewise be utilized to secure against malignant growth. Henceforth daylight can be brought inside our rooms through light transmitting concrete which gives us numerous medical advantages and can likewise represent the moment of truth comfort level inside our rooms. The outcomes obviously demonstrate that the decorative concrete likewise execution dependent on the quality viewpoint is additionally significantly high. Henceforth the utilization of optical fiber will make the solid enhancing just as can make the solid basic productive [1]. The TC boards have the particular property of sunlight transmission, which makes them valuable for vitality proficient building envelopes. [2] The straightforwardness of its development, moderately low cost (except if we talk about the solid with costly added substances), the likelihood of giving the form any ideal shape, gives concrete an extraordinary preferred standpoint over other building materials [3]. This concrete adds to new choices of concrete for economic development [4]. The best an incentive for the utilization of industrially can be determined as 0.934% optical strands by volume, which gives us a compressive quality as high as 20 N/mm2 [5]. It is conceivable to utilize Self compacting mortar (SCM) to create translucent cement contain plastic optical fiber (POF) with compressive quality between 31.1 to 40.4MPa [6]. The compressive quality of the translucent cement was observed to be practically identical with the compressive quality of the controlled cement with comparable characteristics.[7] With the incorporation of Optical filaments in shifted extents of 1%,2%,3%,4% and 5% the quality of cement step by step increments up to a specific limit however the slowly decreases[8]. The compressive quality expanded for the situation for the 0.087% optical filaments by volume test, however at that point, it proceeded to diminish [9]. The compressive quality outcomes got for the translucent cement was practically same as that of the traditional cement [10]. It was discovered that the light transmittance execution of the translucent cement essentially relies upon the rate volume of optical filaments joined [11]. The nearness of cullet up to 13 with weight %, with greatest size lower than 15 cm, somewhat influences the flexural qualities of transparent concrete [12]. The creation procedure of standard translucent cement requires a high ability amid the planning of the molds [13]. The translucent glass solid structures will turn out to be exceptionally normal sooner rather than later because of effectiveness in development and the accessibility of crude materials [14].

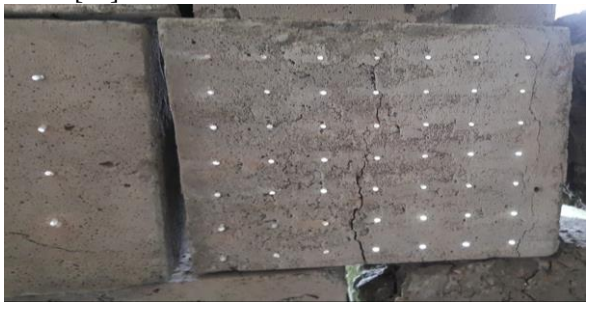

Fig 1: translucent concrete block

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***Correspondence Author(s)**
Nadeem Gulzar Shahmir, Ph.D. Research Scholar civil engineering department, at National Institute Of Technology Srinagar Jammu and Kashmir India.
Dr. Manzoor Ahmad Tantray, Professor civil engineering department, at National Institute Of Technology Srinagar Jammu and Kashmir India.

II. METHODOLOGY

To use translucent concrete in a room it is fundamental that the concrete ought to enable the adequate light to go through it and it was controlled by utilizing lux meter to quantify the force of the light going through the solid. For examination translucent concrete blocks having thickness of 75mm was cast. The procedure incorporates following steps:

Stage 1: The technique will begin from the assembling of the samples to be tested, for that the steel shape molds separately produced was utilized yet since the span of the form was 150mm on each side in this manner card board sheet (Fig 2) was utilized as an isolated inside the shape to partition the form into two equivalent amounts of 75mm thickness.

Fig 2: cardboard sheet dividing cube into two equal parts.

Stage 2: Mold readiness was trailed by the inclusion of optical filaments (fig 3) through the openings effectively penetrated on the two inverse appearances of the shape. The optical filaments utilized in this work are of 2mm width and on surface region of 150mm x 150mm (22500 mm sq.) 49 number of fiber strands was utilized.

Fig 3: fibers weaven across mold.

Stage 3: The following stage was filling of concrete into the form and after the shape was topped off to the best; form was placed at even surface following 24 hours the samples was unmolded and kept for curing to get the ideal quality.

Stage 4: After having concrete cubes prepared with optical filaments embedded the lux meter (fig 4) was utilized to gauge the power. For estimating the light power of the solid 3D square wooden obscure box is utilized.

Fig 4 : Lux Meter Showing Light Intensity

Stage 5: After having the adequate measure of light through the translucent concrete the count are done on the all-out expense of translucent concrete room
(Fig 5) by utilizing translucent concrete in walls or slab of 10ft. x 10 ft. room having stature of 10 ft.

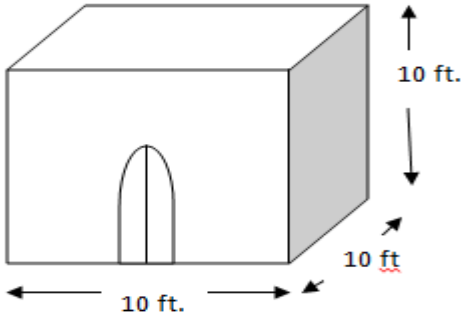

Fig 5: elevation of translucent concrete room.

Stage 6: Finally the counts are done to ascertain the complete vitality spared for the duration of the life expectancy of the room and contrasted with the expense of customary room.

III. RESULTS

Power of light going through 75mm thick 150mm x 150mm size samples by utilizing all out number of 49 strands in a single sample

Sample number	Intensity of light (ux)	Number of strands
Sample 1	46	49
Sample 2,4	44	49
Sample 3	45	49

Normal light force of the four samples tested might be taken as 45 lux which is for surface region of 22500mm sq. what's more, for wall or slab of measurements 10ft. x 10 ft. might be determined as:

1 foot = 304.8mm
10 feet = 304.8 x 10 =3048mm
10ft. x10ft. = 3048 x 3048 = 9290304 mm sq.
In this manner light force through 10ft. x 10ft. wall or slab will be = 9290304 x 45/22500 = 18580 lux which is sufficient power for a living room.

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Market cost of plastic optical fiber with diameter of 2mm is Rs 47 for each meter.

In one concrete cuboid of measurements 150mm x 150mm with thickness of 75mm aggregate of 49 strands are utilized that is absolute length of 3675 mm fiber is utilized in one concrete cuboid consequently in wall of measurements 10ft.x 10ft. complete length of fiber utilized is

9290304 x 3675/22500 = 9290304 x 3.6/22500 = 1486m

Along these lines complete expense of strands used in one wall or slab of 10ft. x10 ft. measure is 1486 x 47 = Rs 69824.

How about we guess the normal life expectancy of room is 50 years and say three globules of each 100w is utilized for six hours every day.

Energy consumed by	Per day	Per year	50 years
One bulb	0.6kWh	219kWh	10950kWh
One room	1.8kWh	657kWh	32850kWh

Consequently aggregate sum of vitality that gets spared utilizing translucent concrete in a room is 32850kWh and at present the approximate rate of single unit of power is 5 Rs/unit in Srinagar and keeping in mind that as in Delhi and different zones it is all the more subsequently all out expense of vitality that gets spared by using translucent concrete in a room is 32850 x 5 = 164250Rs.

IV. CONCLUSION

From above examinations and count clearly next to getting the gigantic number of advantages from translucent concrete we additionally can spare a ton of vitality by using translucent concrete in structures. Obviously the underlying expense for development of just single room using translucent concrete is very nearly 70 thousand rupees more than that of traditional room and requires more consideration while assembling of translucent concrete blocks however in general life cycle of a room we can spare 164250 rupees by limiting vitality utilization. Deducting the cost used for inclusion of strands we can in any case spare the measure of rupees 94926 which obviously will sum up a huge amount in case of tall building. Finally from this research it can be concluded, since the initial cost of the translucent concrete room or building is much more than that of ordinary building but in long run if we concentrate on the energy that gets saved utilizing translucent concrete, definitely it acts as economical and energy efficient source.

REFERENCES:

1. Experimental Analysis of Translucent Concrete by using Optical Fibres by Nikhil, Umer farooq, Silal ahmed, Juraige, Shabeeba omar march 2016 SSRG International Journal of Civil Engineering.
2. Computational Modelling of Translucent Concrete Panels by Aashish Ahuja; Khalid M. Mosalam and Tarek I. Zohdi in November 2014 journal of architectural engineering.
3. Analysis of Transparent Concrete as an Innovative Material Used in Civil Engineering by Monika Zielińska, Albert Ciesielski in 2018 IOP Conference Series: Materials Science and Engineering.
4. Experimental study of light transmitting concrete by Abdulmajeed altomate, Faisal Alatshan , Mohmad Jadan in 2016 International Journal of Sustainable Building Technology and Urban Development.
5. Translucent Concrete: Test of Compressive Strength and Transmittance A Karandikar N. Virdhi A. Deep.
6. Effect of Plastic Optical Fibre on Some Properties of Translucent Concrete by Dr. Shakir Ahmed Salih, Dr. Hasan Hamodi Joni , Safaa Adnan Mohamed in November 2014 Eng. &Tech. Journal, Vol. 32, Part (A), No.12, 2014
7. Compressive strength of translucent concrete by Salmabanu Luhar, Urvashi Khandelwal in Sept 2015 International Journal of Engineering Sciences & Emerging Technologies
8. Litracon by Shreyas.K in Sept 2018 International Journal of New Technologies in Science and Engineering.
9. Translucent concrete: Test of compressive strength and transmittance by A. Karandikar in 2015 International journal of engineering research and technology
10. Experimental Study of Light Transmitting Concrete Using Optical Fibre by Sachin Sahu, Amlan Kumar Sahoo, Aman Kumar Singhal, Kuramana Stephen, Tamo Talom, Subham Saroj Tripathy, Sidhant Das in 2018
11. Experimental Evaluation on Light Transmittance Performance of Translucent Concrete by Awetehagn Tuaum, Stanley Muse Shitote and Walter Odhiambo Oyawa in 2018 international journal of applied engineering research.
12. A novel translucent concrete panel with waste glass inclusions for architectural applications by Valerio R.M. Lo Verso, Simonetta L. Pagliolico and Laura Ligi in july 2015 the indian concrete journal.
13. Evaluation of The Mechanical Properties of Translucent Concrete by Dr. Shakir Ahmed Salih , Dr. Hasan Hamodi Jonj , Safaa Adnan Mohamad in april 2018 International Journal of Engineering Trends and Technology (IJETT)
14. Study of Translucent Glass Concrete by Sisira Sugunan , Nisha Babu, Sowparnika M. in 2016 IOSR Journal of Mechanical and Civil Engineering

AUTHOR PROFILE

Nadeem Gulzar Shahmir is a Ph.D. research scholar at National Institute of Technology Srinagar and is doing his research on translucent concrete under the guidance of prof. Dr. Manzoor Ahmad Tantray. He has completed his masters and bachelors in civil engineering in year 2015 and 2013 respectively. Besides he also has a teaching experience of 01 year and has published several number of research papers in national and international journals related civil engineering.

Dr. Manzoor Ahmad Tantray is a professor at National Institute of Technology Srinagar. He has completed his Ph.D. in civil engineering from IIT roorkee and has a vast teaching experience of more than 20 years. His area of research mainly includes concrete technology, reinforced concrete, translucent concrete and many other fields related to structural engineering. He has published various number of research papers in national and international journals and organized and attended several conferences.

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