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Experimental Study of Light Transmitting Concrete (LITRACON)

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ABSTRACT

These days, a Skyscrapers and high-rise structures supplant smaller ones. One of the issues with obtaining natural light in buildings originates from the surrounding constructions' occlusion. Because of this issue, there is a significant growth in the usage of artificial lighting sources in buildings. Since concrete is weak in tension and elasticity and strong in compression, it is imperative to minimize artificial light consumption in structures. In 2003, LiTraCon (light transmission concrete) successfully manufactured the first transparent concrete block.

Keywords: Translucent concrete, optical fibre, energy saving, smart construction

Objective:

To cast a unique kind of concrete that transmits light, to research their qualities, and to create a material that works and provides both an aesthetic and energy-saving finish.

INTRODUCTION:

Concrete has developed the ability to adjust to practically any arising difficulties. Hungarian architect Aron Losonzi originally proposed the idea of transparent concrete in 2001. In 2003, a substantial amount of glass fiber was successfully mixed with concrete to create the first transparent concrete block, known as LiTraCon. Joel S. and Sergio O.G. created a translucent concrete substitute that weighs only 30% of regular concrete while allowing 80% of the light to pass through. It is noteworthy to notice that the Italian Pavilion at Shanghai Expo 2010 has a translucent concrete type created in 2010 by incorporating glass into concrete. With an imbedded array of glass fibers that may display a perspective of the outside world, like the outline of a tree, LitraCon" possesses the strength of traditional concrete. Between each block's two major surfaces, thousands of optical glass fibers create a matrix and run parallel to one another. On the darker side, the brighter side's shadows will have distinct outlines. Not even the colors change. The overall impression produced by this particular effect is that a concrete wall's weight and thickness will vanish. The idea behind the new material is to give concrete structures' interiors a lighter, more airy feel as opposed to a heavier, darker look.

PRINCIPLES:

According to "Nano-Optics." Optical fibers may transmit the same amount of light when their microscopic openings are stacked one on top of the other or staggered. Principal is able to travel because the concrete's optical fibers function as apertures, distributing light throughout the material.

MANUFACTURING PROCESS:

Transparent concrete is made in a manner that is nearly identical to that of ordinary concrete. All that is present in the aggregate and cement mix are optical fibers. The fibers are injected into small layers of concrete that are poured on top of one another and joined. To transfer natural or artificial light, thousands of optical fiber strands are poured into concrete.Adding 4% to 5% optical fibers by volume to the concrete mixture yields light-transmitting concrete. Only fine components make up the concrete mixture; coarse aggregate is not included. The optical fibers' thickness may be adjusted between 2 µm and 2 mm to meet specific needs for light transmission.Instead of using single filaments, woven fiber fabric is used in automated production processes. In molds, fabric and concrete are put alternately at intervals of around 2 to 5 mm.More light can enter the concrete through layers that are thinner or smaller.After casting, the material is usually polished to provide finishes ranging from semi-gloss to high-gloss. It is then cut into panels or blocks of the desired thickness.

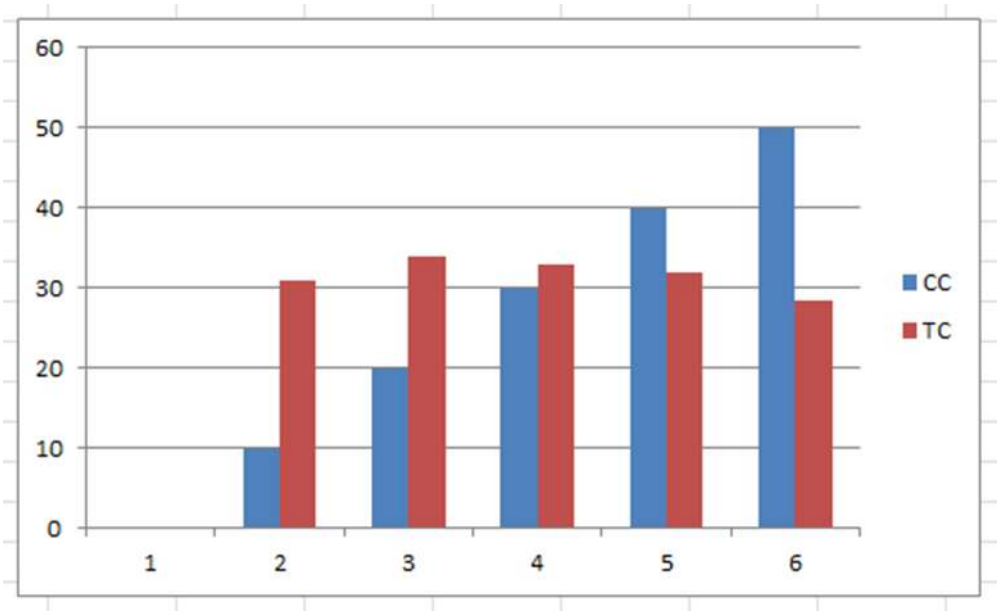
Experimental Investigation:

I) WORKABILITY

The slump cone test is used to assess the concrete's workability, and 90 mm of slump is found.

II) COMPRESSIVE STRENGTH

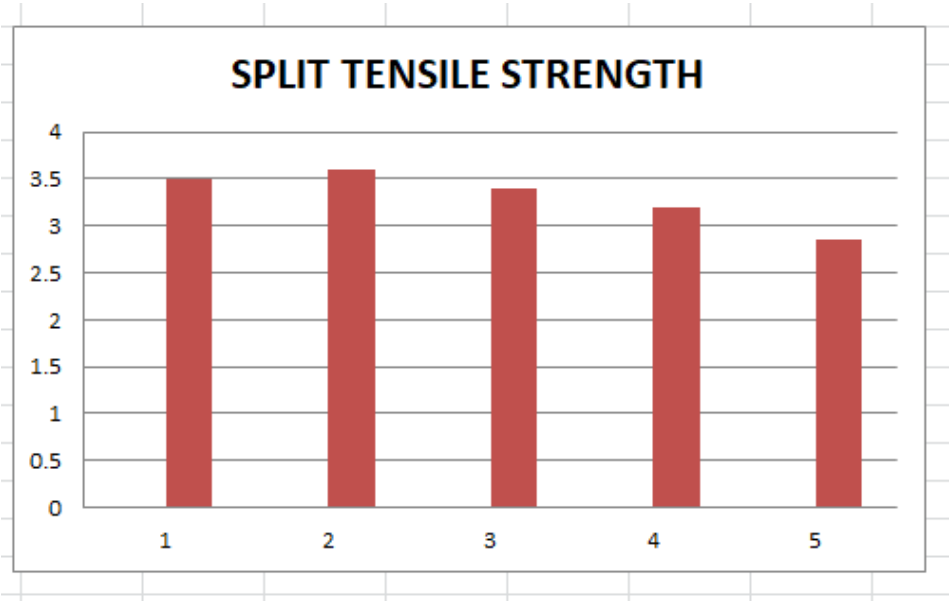
A compressive test is often used to obtain the compressive strength experimentally. Concrete's compressive strength is measured by casting 150 mm x 150 mm x 150 mm cubes. Conventional concrete and light-transmitting concrete have respective compressive strengths of 7, 14, and 28 days.



III) FLEXURAL STRENGTH

The installation of optical fiber will therefore make the concrete ornamental as well as potentially make it structurally efficient. The flexural strength (single beam with center point load technique) of the conventional concrete and light transmitting concrete in 7, 14, and 28 days There is a correlation between the strength results of ornamental concrete and regular plain cement concrete.The findings clearly demonstrate that ornamental concrete performs exceptionally well in terms of strength as well.

Thus, the use of optical fiber will enhance the concrete's aesthetic appeal while also potentially improving its structural effectiveness.



CONCLUSION:

Translucent concrete blocks are very useful and may be utilized in a variety of ways and forms. The one downside, though, would be the expensive price. Despite this, affluent architects continue to use it. It's a fantastic indication of appeal and creative development. Any building that even somewhat features transparent concrete is sure to turn heads and leave people in amazement. In addition to the aesthetic elements, there is this monitoring and security. Large homes with substantial security fences are frequently not very secure. For this reason, the majority of them have electric fence installed. With this, green buildings would easily receive accreditation for daylight savings time. Transparent ceilings allow large, towering office buildings to share illumination. Heat insulation and energy savings are only two more of its incredible qualities. The concrete of the future is transparent. It is a clever method of living that maximizes and makes use of light. This ornamental concrete may be utilized as panels for walls, slabs, and other surfaces in interior architecture. Because ornamental concrete allows sunlight to pass through, it may be utilized in place of windows. Therefore, the use of optical fiber will enhance the concrete's aesthetic appeal and potential structural efficiency.

Basma F. Bashbash. (2013). “Basics of light Transmitting Concrete”, pp 079-083, (2013)

[2]. Jianping He. (2011). “Study on Smart Transparent Concrete Product and its performances”, 6thinternational workshop on advanced smart materials and smart structures technology, (2011)

[3]. IS: 10262-1982 Recommended Guidelines for Concrete Mix Design.

[4]. Victoria Bailey, Translucent Concrete, published on MEEN 3344-001, 11:00-11:50 MWF

[5]. http://www.materialproject.org/wiki/Translucent_concretehttp://www.litracon.hu

[9]. https://www.google.com/patents/EP1947069A1?cl=en&dq=translucent+concrete&hl=en&sa=X&ei=NnsCUoaNdDyrQfj0oDQBw&sqi=2&pjf=1&ved=0CDQQ6AEwAA\

[10]. https://www.gaoogle.com/patents/EP2410103A2?cl=en&dq=translucent+concrete&hl=en&sa=X&ei=NnsCUoaNdDyrQfj0oDQBw&sqi=2_&pjf=1&ved0CDsQ6AE