

EXPERIMENTAL STUDY ON COMPRESSIVE STRENGTH OF TRANSLUCENT CONCRETE

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ABSTRACT

The concrete used in the construction industry generally consist of cement, water and aggregate (fine or coarse). As is well known, traditional concrete has a grayish color and shapes through it. As can be imagined, concrete with the characteristic of being translucent will permit a better interaction between the construction and its environment, thereby creating ambiances that are better and more naturally lit, at the same time as significantly reducing the expenses of laying and maintenance of the concrete. Along with the translucent characteristics, the paper confines its area toward the reinforcement method of this type of concrete such that they can be practically implemented as a load bearing structure. This new kind of building material can integrate the concept of green energy saving with the usage self-sensing properties of functional materials.

1. INTRODUCTION

Concrete is a construction material composed of cement, fine aggregates (sand) and coarse aggregates mixed with water which hardens with time. Portland cement is the commonly used type of cement for production of concrete. Concrete technology deals with study of properties of concrete and its practical applications. In a building construction, concrete is used for the construction of foundations, columns, beams, slabs and other load bearing elements.

There are different types of binding material is used other than cement such as lime for lime concrete and bitumen for asphalt concrete which used for road is construction. Various types of cements are used for concrete works which have different properties and applications. Some of the type of cement is Portland Pozzolana Cement (PPC), rapid hardening cement, Sulphate resistant cement etc. Materials are mixed in specific proportions to obtain the required strength. Strength of mix is specified as M5, M10, M15, M20, M25, M30 etc, where M signifies Mix and 5, 10, 15 etc. as their strength in kN/m².

Water Cement ratio plays an important role which influences various properties such as workability, strength and durability. Adequate water cement ratio is required for production of workable concrete. When water is mixed with materials, cement reacts with water and hydration reaction starts This reaction helps ingredients to form a hard matrix that binds the materials together into a durable stone-like material. ACI 318 Building code requirements for structural concrete and ACI 301 Specifications for Structural Concrete are used in United States as standard code of practice for concrete construction.

There are different types of admixtures which are used to provide certain properties Admixtures or additives such as pozzolans or superplasticizers are included in the mixture to improve the physical properties of the wet mix or the finished material. Various types of concrete are manufactured these days for construction of buildings and structures. These have special properties and features which improve quality of construction as per requirement.

1.2 Components of Concrete:

Components of concrete are cement, sand, aggregates and water. Mixture of Portland cement and water is called as paste. So, concrete can be called as a mixture of paste, sand and aggregates. Sometimes rocks are used instead of aggregates. The cement paste coats the surface of the fine and coarse aggregates when mixed thoroughly and binds them. Soon after mixing the components, hydration reaction starts which provides strength and a rock solid concrete is obtained.

2. WHAT IS TRANSLUCENT CONCRETE?

Translucent concrete is a combination of optical fiber and fine concrete. Number of fiber run side by side transmitting light between the two surfaces of each element. Because of their small size the fiber blend into concrete becoming a component of a material like small piece of ballast.

In theory, a wall structure created out of translucent concrete block can be a couple of meter thick as the fiber work almost without loss in light. Moreover the block are load bearing and provide the some effect with both natural and artificial light. Plastic optical fiber leads light by point between the light surfaces. Shadow on the lighter side will appear with sharp outline on the darker one. Even the color remains the same. Such a wall with optical fiber pixels act as if scanner and screen are united. This special effect creates the general impression that thickness and weight of the concrete wall disappear. Translucent concrete blocks are produced depending on aesthetic wishes and structural need of project.

3. MIX DESIGN

Concrete was designed for developing, 20 N/mm^2 Characteristic compressive strength on 28th day. The mix design was carried out in according with IS: 10262-2009, also tabular value from IS: 456-2000 were used.

3.1 Design requirement:

- | | | |
|---|---|---------------------|
| a) Characteristic compressive strength at 28 days | = | 20 N/mm^2 |
| b) Maximum size of available aggregate | = | 10mm |
| c) Shape of C.A | = | Angular |
| d) Degree of Workability desired | = | 0.86 |
| e) Degree of Quality control | = | Good |
| f) Type of exposure | = | Mild |

3.2 Test data for concrete making material

- | | | |
|--------------------------------------|---|-------|
| a) Specific gravity of cement | = | 3.15 |
| b) Specific gravity of cement of C.A | = | 3.04 |
| c) Specific gravity of cement of F.A | = | 2.3 |
| d) Water absorption in C.A | = | 0.10% |
| e) Water absorption in F.A | = | 0.14% |
| f) Free (Surface moisture in C.A) | = | nil |

- g) Free moisture in F.A = nil
- h) Compressive strength of cement = 53 N/mm

4. RESULT

In this chapter we discuss the properties of the transparent concrete with the basis of test carried out, like compressive test, L.D.R test and by photoelectric cell.

Table 4.1: Compressive Strength test.

Sr.No	For 5% of optical fiber in N/mm ²	For 5.5% of optical fiber in N/mm ²	For 6% of optical fiber in N/mm ²
1	13.13	14.95	16.11

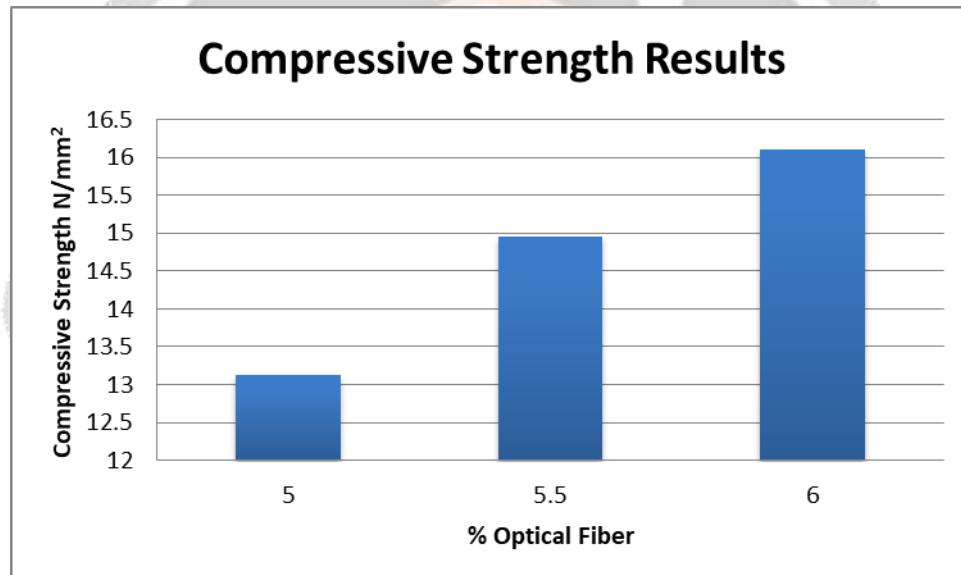


Fig-1: Compressive strength of cubes

3. CONCLUSIONS

1. Compressive strength after 5% of optical fiber of total volume of blocks, strength will go on increasing.
2. The rate of passing the light threw the L.D.R test is 6:1 pass from one end to another end of block.
3. The light transference by photoelectric cell method is 22.55% of voltage passes from one end to another end of block.

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