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A Study of Partially Light Weight Transparent Concrete

Devesh Singh[1], Sabya Gupta[2], Anil Pratap Singh[3]

[1,2]U.G. Scholar,[3]Assistant Professor, CE

Department of Civil Engineering, Buddha Institute of Technology, GIDA, Gorakhpur (India)

ABSTRACT

Resin is utilized to make light weight transparent concrete that serves very effectively as energy saving in interiors of structure and also reduces the total dead load of building on the foundation in a very low cost using natural resources. To replace some part of aggregate in regular concrete M 25 mix, with that in the mind a research was conducted. This research involved the prepartation of concrete mix which are [1 cement : 1 sand :3(Aggregate)] and concrete blocks are casted. After casting, the test is performed to know the compressive strength, flexural strength test in according with IS-456, IS 3370. The concrete blocks are of dimensions 150mm X 150mm X150mm.

Keywords: *Aggregate, Cement, Sand, Resin, Resin mould.*

- **INTRODUCTION**

A few decades ago concrete was often misunderstood, disliked and captured by its image fixed due fast urbanization in 1960's. Now concrete is making considerable progress not only technical terms, but also in aesthetic terms. It becomes light and no longer the heavy, cold and grey material of the past. It has become aesthetically good and lively. By research and innovation, newly prepared concrete has been made which is more resistant, lighter, white or coloured etc. In 2001, first of all the concept of transparent concrete was introduced by Hungarian architect Aronlosonzi and first transparent concrete block was successfully was casted, but this research uses optical fiber as transparent material But this optical fiber increases the cost. So the concrete becomes uneconomical. Transparent concrete in architecture is used as a façade material and for new design to make the construction look much attractive. Transparent concrete is the result of research which utilizes the sunlight to emit in the internal part of it and also used as fine architecture as front. Building an environment which depends on the natural resources which is not expected to be finish in life-cycle will be a great change towards the atmosphere for the upcoming generation and transparent concrete is all about it. Our paper on the use of transparent concrete aims to utilize the high amount of potential energy which is in the form of sunlight. While approaching towards a material which can give the same strength as of general concrete with different we should go toward transparent concrete. Light transparent concrete is made by clear casting resin. First of all Light transparent concrete was developed by Hungarian scientist Ron Losonczi at Technical university of Budapest Light weight is achieved removing concrete at predetermined extent and light transparency is achieved by using resin .It can be used for interior and exterior walls, slabs, floor, partition walls. By embedding clear casting resin light can be transmitted from outside to inside and this concrete is very

efficiency as total incoming light get transmitted through resin medium.

A wall made with light concrete has more strength than traditional concrete and embedded array of resin that can display the scenario of outside world withclarity.SIGNIFICANCE OF PROJECT

1- To make concrete for aesthetically pleasing by light transmitting through its surface.

2- To reduce the total Dead weight ofconcrete.

3- Relatively cheaper than concrete prepared by use of opticalfibre.

4- To check whether the embedding of resin improves the engineering properties ofconcrete.

- **MATERIALS**

1-Cement

Cement used in the experimental work is Portland Pozzolona Cement:

Table1: cement

S.NO	CHARACTERSTICS	TEST RESULT	STANDARD RESULT(as per IS CODE)
1	Consistency	30%	30%
2	Initial Setting Time	30 min	Not less than 30 min
3	Final Setting time	600 min	Not more than 600 min
4	Specific Gravity	3.15	3.15
5	Fineness Modulus	4%	Not more than 10%
6	Compressive Strength	45N/mm2	Not less than 43N/mm2

- **Fine aggregate**

Fine aggregate was purchased which satisfied the required properties of fine aggregate required for experimental work and the sand conforms to zone II.

a) Specific gravity =2.60

b) Fineness modulus =2.80

c) Silt content=2.65

- **Coarse aggregate:-**

The crushed aggregates used were 20mm nominal maximum size. The sieve analysis of combined aggregates confirms to the specifications of IS 383: 1970 for graded aggregates.

a) Specific gravity=2.73

b)Fineness Modulus =6.8

- **Water**

Mixing water should not contain undesirable organic substances or inorganic constituents in excessive proportions. In this project clean potable water is used.

- **Mix design for M-25 Grade Concrete:-**

Characteristic Compressive Strength required at the end of 28 days: 25 N/mm^2 Maximum size of Aggregate: 20mm

Type of Exposure: Severe

- **Test Data for Materials**

Specific Gravity of Cement: 3.15

Specific Gravity of Coarse Aggregate: 2.70 Specific Gravity of Fine Aggregate: 2.60

- **MANUFACTURING PROCESS**

Transparent concrete is made of fine-grain concrete and resin. Because of resin, solidity and consistency of transparent concrete are more than the traditional concrete. Almost free energy loss light penetration through resin makes it possible to see light array, shadows and even colors through concrete even by very thick walls. It can be made as prefabricated building blocks and panels. In this way, the resultant is not mixed material like glass in concrete but a new construction material, which is homogeneous in its inner structure as well as on its main surfaces. The resin leads light passed by points between the two sides of the blocks. Because of their parallel position in concrete, the light-information on the brighter side of such a wall appears unchanged on the darker side and there is similarity of outside light and interior of structure. use of resin enhances the strength of concrete as it possess relatively high strength of 91 N/mm2 . Moreover, the colour of the light also remains the similar as it does not get dispersed inmedium.

- **TEST CONDUCTED ON CONCRETE**

There are three types of test in concrete-

1-Workability

2- Compressive strength test

3- Flexural strengthtest

- **WORKABILITY**

The workability of light transmitting concrete is determined by conducting slump test and compaction factor test.

- **TEST RESULT**

1. Slump =80mm
2. Compaction factor =0.90

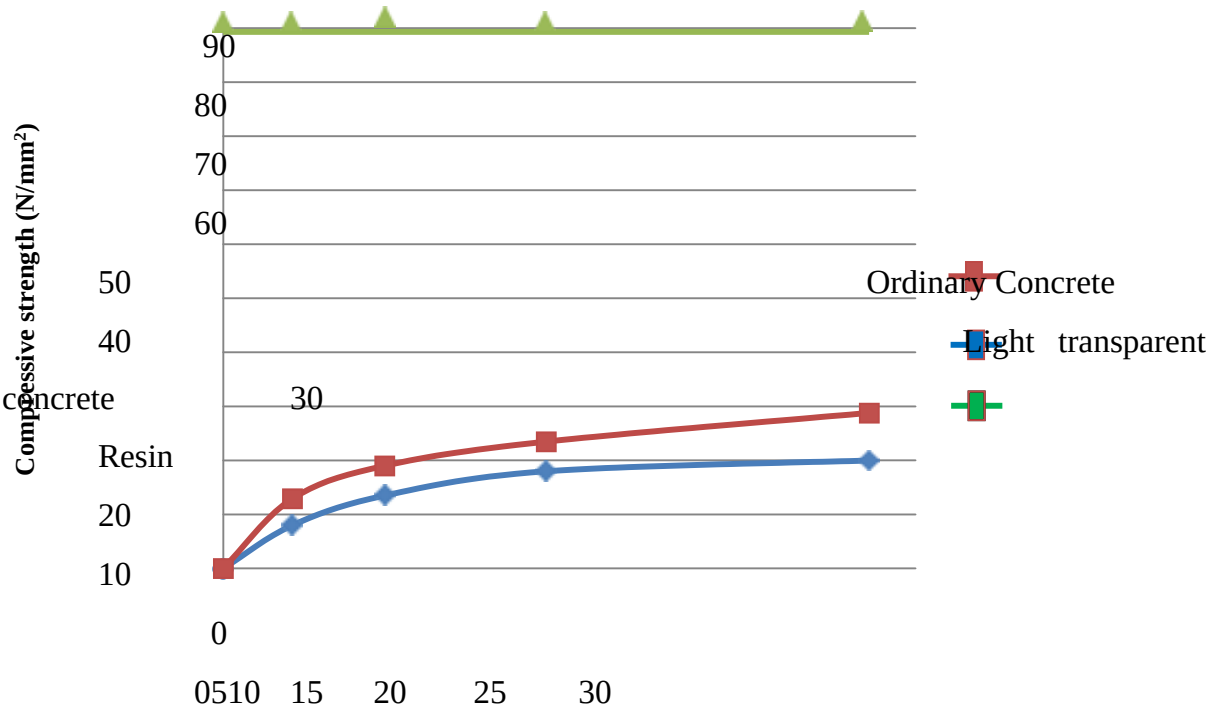
Figure-1 Figure-2

- **COMPRESSIVE STRENGTH TEST**

- By definition compressive strength of concrete is that value of uniaxial compressive stress obtained, when the material failsentirely.

- The compressive strength is determined by compressive strength test. The compressive strengthtest.
- The compressive strength of cube size 150mm X 150mm X 150mm bycasting.

TEST RESULT



Test day	Ordinary concrete	LightTransmitting concrete	Casting resin
7th day	13.5	17	91
14th day	18	23.46	91
28th day	20	28.78	91

- **FLEXURAL STRENGTH TEST**

Flexural strength of light transmitting concrete is determined by conducting test on UTM. Flexural strength of concrete is defind as stress in concrete just before yields in flexural strength test

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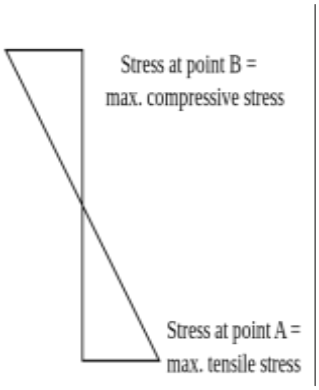
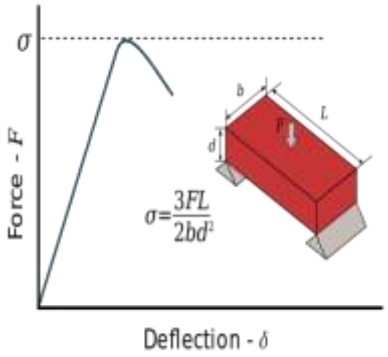
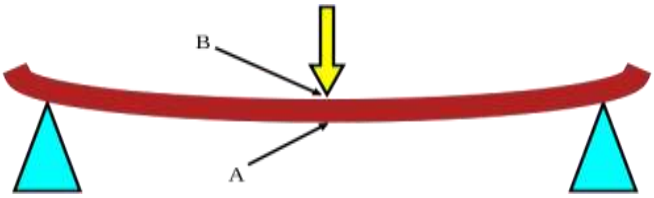




- **TEST RESULT**

Flexural strength of light transmitting concrete = 9.2N/mm^2



- **STRENGTH OF RESIN**

The properties of resin were mentioned on the packet purchased from market.

- **CONCLUSION**

Transparent concrete blocks can be used in many ways and implemented into many forms and be highly advantageous. Yet, the only drawback would be it is not easly avalible in abundant qunatity. That doesn't stop high class architects from using it. It's a great sign of attraction and artistic evolution. Any structure with a small hint of Transparent concrete is bound to make heads turn and make them stand in awe. The compressive strength of Transparent concrete is greater than the strength of the ordinary concrete and it has the property to transmitting light. If the percentage of the resin increased than the strength of the concrete starts decreasing so we can conclude that the strength of Transparent concrete is inversely proportional to light transmittance.

- It is concluded that on usage of resin, the compressive strength increased as resin also possess higher strength thanconcrete.
- The study concludes that the transparent of concrete is possible to make without affecting its compressivestrength.

- In Transparent concrete to achieves for the light weight and good strength for normal concrete in used for various purpose.
- They used in future for various used in civil engineering field.

Transparent concrete achieves maximum effeteness when used in an environment with a high degree of light contrast, such as this illuminated table in a dimly lit room. The strength results of decorative concrete are correlated with results of ordinary plain cement concrete. The results evidently show that the decorative concrete also performance based on the strength aspectis also considerably high. Hence the application of resin will make the concrete decorative as well as can make the concrete structurallyefficient.

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