

Light Weight Translucent Concrete

Bismi V B¹, Geethika G Pillai²

¹PG Student Indira Gandhi Institute of Engineering and Technology, Kothamangalam, Kerala

²Assistant Professor Indira Gandhi Institute of Engineering and Technology, Kothamangalam, Kerala

Abstract – Light weight Translucent concrete is transmit the sunlight in good method it also enhances the beauty of building and also reduces the power consumption. Similarly it has high strength. light weight Translucent is assemble by arranging Definite plastic optical fiber over the concrete. The light weight translucent concrete we obtain when we replace the fine aggregate with coir pith. Coir pith is the byproduct from coir industry. In this study M30 grade concrete was adopted. for the manufacture of light weight translucent concrete adding 2%,4% and 6% plastic optical fibre of the weight of cement and 5%,15% and 25% coir pith with replacement of fine aggregate.

Key Words: Translucent concrete, Light weight translucent concrete, Plastic optical fiber, Coir pith, Light transmittance

1. INTRODUCTION

Light weight translucent concrete is creative matter with various implementation in the construction and architecture field. Translucent concrete is the combination of plastic optical fibre and fine and coarse aggregate, cement and water. One of the main speciality of light weight translucent concrete is lighting the buildings with daylight that will make good environment .this project mainly focus on light weight translucent concrete. For obtaining a light weight translucent concrete mix the fine aggregate is replaced with coir pith. with the replacement of coir pith it reduce the self weight of structure. Through this project we are going to study and compare the effect of both translucent concrete and light weight translucent concrete.

1.1 Objectives

- Determination Of Compressive Strength and Flexural Strength Of translucent concrete And Light Weight Translucent Concrete
- Check For Light Transmittance
- Determine The Effect Of Workability Of The Concrete
- Check If The Specimen Made Is Light Weight
- Can be used to make green buildings

1.2 Scope

- This is limited to m30 mix
- To learn different proportion of POF with various curing periods
- analysis the long term durability properties
- examine the shrinkage and creep behavior
- inspect the structural integrity of fibrous material
- learning the thermal properties of light weight translucent concrete

1.3 Methodology

- Literature review
- Collection of materials
- Preliminary test on materials
- Proportioning of mix
- Preparation of mix
- Casting and curing of specimen
- Testing of specimen
- Analysis of result

2. MATERIALS USED

2.1 Cement

In this study ordinary Portland cement-grade 53 is used. Specific gravity and Standard consistency is 3.14 and 34%. initial and final setting time of cement is 87 and 287 minutes

2.2 Fine aggregate

For this project we adopted Manufactured sand. The Manufactured sand we use should be from impurities.

2.3 Coarse aggregate

Naturally available coarse aggregate from quarries of maximum size 20mm was used.

Table -1: Properties of aggregate

properties	Fine aggregate	Coarse aggregate
Specific gravity	2.70	2.80
Water absorption(%)	1.47	.62
Bulk density(kg/l)	1.2	1.31

2.4 Plastic optical fiber

2mm plastic optical fiber strands are used.it is made by using polymer.it transmits light through the core of fiber. Cladding is made up of silicon resin.



Fig -1: Plastic optical fiber

2.5 Coir pith

Coir pith is a byproduct of the coir industry. they can reduce the self weight of the structure.it consist of coir fibre pith or coir dust which is obtained by processing coconut husk and removing the long fibre.



Fig -2: Coir pith

2.6 Super plasticizer

The Super plasticizer “master glemium SKY 8233” is used for concrete mix.it is admixture based on poly carboxilic ether.

Table -2: Physical properties if superplasticizer

colour	Light brown
Relative density	1.08±.01@25
pH	≥6
Chloride iron content	<.2%

2.7 water

Portable water available in the laboratory was recommended for this experiment.

3. EXPEREMENTAL PROGRAMME

3.1 Preparation of test specimen

The ingredients of concrete such as fine and coarse aggregate, water and cement were mix in a missing pan. During the mixing process super plasticizer mixed in 20% of water is sprayed till uniform mix is obtained.in order to make light weight translucent concrete the coir pith must be put on at this time. Place a layer of concrete first. Then place the top layer of optical fiber concrete according to percentage.

3.2 Proposed mix Desgin

Mix design for M30 mix was done as per the provisions in Indian Standard.

Table -3: Mix proportion details

grade	M30
Cement	370kg/m ³
Water	157.6kg/m ³
Fine aggregate	939kg/m ³
coarse aggregate	1055kg/m ³
Water cement ratio	.43
Superplasticizer	.3%
Mix proportion	1:2.53:2.85

3.3 Mix Designation

The different mixes for the project work with varying percentage of POF and with coir pith as shown in table 4.

Table -4: Mix designation

Mix Designations	Description
C1	0% coir pith +2% of POF
C2	0% coir pith +4% of POF
C3	0%coir pith +6% of POF
C4	5% coir pith +2% of POF
C5	5% coir pith+4% of POF
C6	5% coir pith+6% of POF
C7	15% coir pith+2% of POF
C8	15% coir pith+4% of POF
C9	15% coir pith+6% of POF
C10	25% coir pith+2% of POF
C11	25% coir pith+4% of POF
C12	25% coir pith+6% of POF

4. RESULT AND DISCUSSION

4.1 Slum Test

The result of various samples are tabulated in table

Table -5: Slum values

Concrete Mix	Slump (mm)
C1	68
C4	81
C7	83
C10	84

4.2 compressive strength

The compressive strength of cube is estimated on the cube 100x100x100mm examples tested were tried for the compressive quality at 7 and 28 days of age.

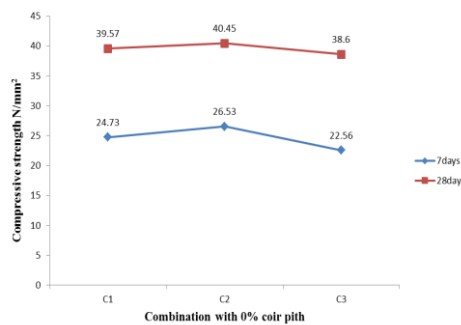


Chart -1: Compressive strength Vs 0% coir pith

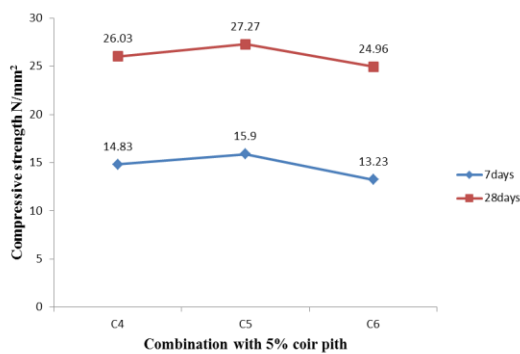


Chart -2: Compressive strength Vs 5% coir pith

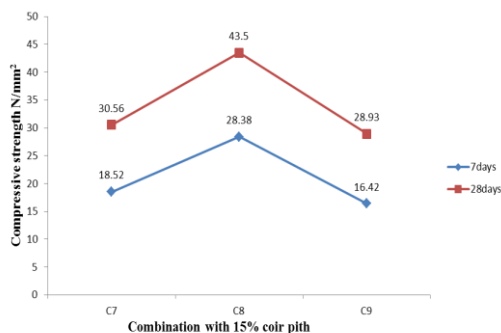


Chart -3: Compressive strength Vs 15% coir pith

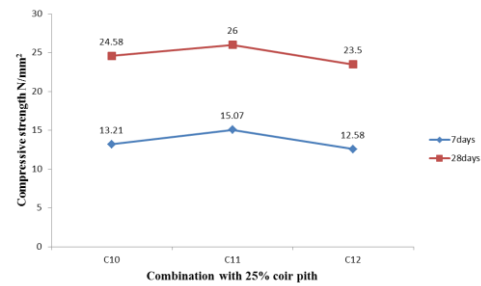


Chart -4: Compressive strength Vs 25% coir pith

4.3 flexural strength

The flexural strength of beam is estimated on the beam 500x100mm examples tested were tried for the flexural quality at 7 and 28 days of age.

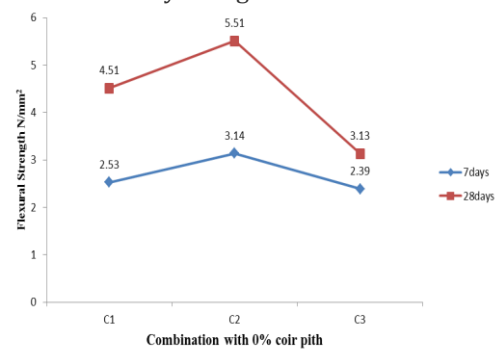


Chart -5: Flexural strength Vs 0% coir pith

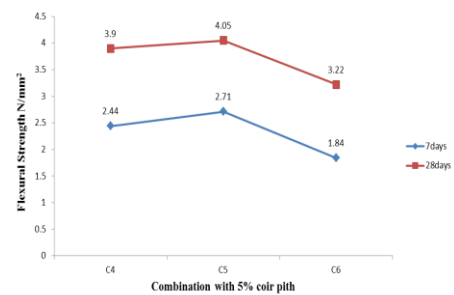


Chart -6: Flexural strength Vs 5% coir pith

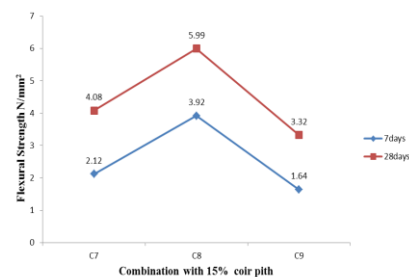


Chart -7: Flexural strength Vs 15% coir pith

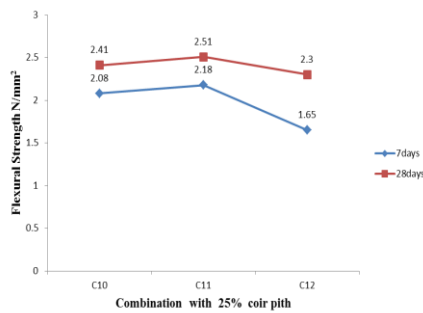


Chart -8: Flexural strength Vs 25% coir pith

4.4 Light transmittance test

This test can be done using simple Lux meter. This can be made in a laboratory. Light transmittance through sample can be measured by measuring the current corresponding to the light, which can be measured by light dependent resistors (LDR). So the two readings are taken, one without sample (A₁) and one with sample (A₂). The source of light here taken as 200W incandescent bulbs, 100Ω resistance is applied in the circuit and a uniform DC voltage of 2.5V is kept connecting the circuit for this test. To ensure no light escape throughout the test, for that the specimen needs to be placed in a plywood box. Light source is fixed at the top of the box and similarly LDR is placed at the bottom.

$$\text{Light transmittance} = 100 - [(A_1 - A_2) / A_1] \times 100$$

A₁ = Ammeter reading without specimen

A₂ = Ammeter reading with specimen

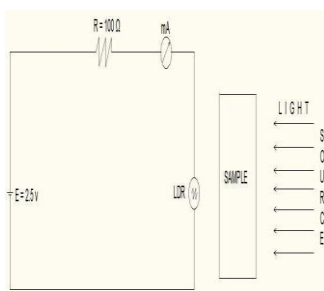


Fig -3: Circuit diagram

Table -6: Light transmittance tests results

Mix Designations	A ₁ (mA)	A ₂ (mA)	Light Transmittance (%)
C1	15.35	1.36	8.85
C2	15.35	1.46	9.51
C3	15.35	1.71	11.14
C4	15.35	1.38	8.99
C5	15.35	1.47	9.57
C6	15.35	1.74	11.33
C7	15.35	1.38	8.99
C8	15.35	1.50	9.77

C9	15.35	1.76	11.46
C10	15.35	1.51	9.83
C11	15.35	1.56	10.16
C12	15.35	1.78	11.59

The relationship between percentage of POF and light transmittance is shown in the figure.

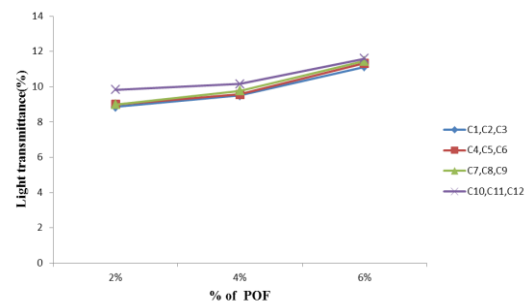


Chart -9: % of POF Vs light transmittance (%)

4.5 Weight of specimen

Test has been done to measure the weight of specimen so as to check if the specimen made is light weight. This graph shows the difference in weight of specimen vs % of coir pith. The weight of cube and beam of translucent concrete was 2.47 and 12.99 kg.

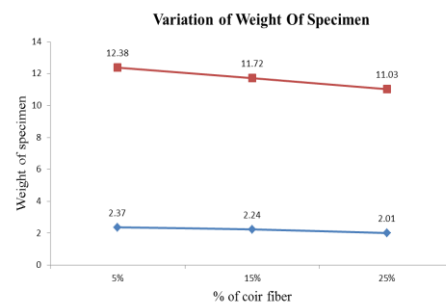


Chart -10: Weight of specimen vs % of coir fiber

5. CONCLUSIONS

In this study we adopted mix for M30 concrete. The light weight translucent concrete prepared shows good light transmittance. The main benefit of using light weight translucent concrete is that increment in the strength properties along with the natural light transmission. From the experimental result, following conclusions can be drawn:

- The optimum mix of translucent concrete with 4% addition of plastic optical fiber
- The optimum mix of light weight translucent concrete with 15% replacement of fine aggregate with coir pith
- At 15% of coir pith, light weight translucent concrete achieves higher strength than translucent concrete
- Translucent concrete and light weight translucent concrete showed good light transmitting property

Transmitting property, which is directly depended on the percentage of plastic optical fiber.

- Light weight translucent shows more transmitting property compared to translucent concrete.
- Light weight translucent concrete is more workable..
- Replacement will give an excellent result strength.

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