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Determine Compressive Strength of Concrete Using Recron Fiber

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ABSTRACT:: This paper describes the results of a study carried out for investigating the structural behavior of fibre reinforced concrete is of high strength compared to normal concrete and also reduces the cracks due to shrinkage. In this Project, Recron fiber is added to concrete in the proportion of 0%, 3%, 4%, and 5% by the weight of cement (Grade 53). This investigation is done in 2 different grades of concrete such as M25. For strength parameters, each grade of concrete for each proportion, cubes of 15cm * 15cm * 15cm are casted for 7 days, 14 days and 28. The compressive strength is found and compared.

KEYWORDS:: recron fibre, recron fibre concrete, steel fibre.

I. INTRODUCTION

Fibers include glass fibers, Steel fibers, natural fibers and synthetic fibers. Within these different fibers that characteristics of fiber reinforced concrete changes with vary concretes, fiber materials, geometries, distribution, orientation and densities. Its properties would obviously, depend upon the well organized transfer of stress between mixture and the fibres, which is largely dependent on the types of fibres, fibre orientation, geometry of fibres, compaction and mixing techniques and size of aggregate. Our main aim is to increase the strength of the concrete by adding recron fibre to it.

Plain concrete is good in compression but weak in tensile strength with limited ductility and little resistance to cracking. In case of rigid pavements cracks are formed due to the variation in shrinkage, temperature and heavy live loads. This type of concrete is known as "Fiber reinforced Concrete ." In these thesis an attempt will be made to view the behavior of concrete mixed with RECRON 3s FIBER in comparison with plain concrete.

II. MATERIALS

Cement: In this experiment, 53 Grade Ordinary Portland cement (OPC) with brand name Birla Cement was used for all concrete mixes. Conforming to IS: 8112-1989.

Sr. No	Property	Values
1.	Fineness of Cement	3.6%
2.	Specific gravity of cement	3.15
3.	Consistency of standard cement paste	30%
4.	i) Initial setting time	92 minutes
	ii) Final setting time	275 minutes
5.	i) Compressive Strength for 7 days	16.24 N/mm ²
	ii) Compressive Strength for 14 days	21.97 N/mm ²
	iii) Compressive Strength for 28 days	26.24 N/mm ²

Table 1: Physical properties of cement

Loss on ignition	0.57
Absolute density	3 g/cm ³
Blaine specific surface	3678 cm ² /g
Cement class	37.10 ± 0.62 MPa

Table 2: Physical Properties of Crushed Sand.

Sr. No.	Properties	Unit	Value
1.	Chemical Composition	-	Modified Polyster
2.	Cross Section	-	Triangular
3.	Diameter	micron	30-40
4.	Elongation	%	>100
5.	Cut Length	mm	6.12 & 18mm
6.	Moisture Flat	%	<1.0
7.	Melting Point	C	240-260
8.	Softening Point	C	220
9.	Specific Gravity	cc/g	1.34-1.40

Table 3: Properties of Recron 3s Fiber (As per supplier)

III. METHODOLOGY

Preparation: Mix Proportion: M20 Grade of concrete with the mix ratio (1:2:4) was adopted with and the water cement ratio was 0.45. The fiber quantity in concrete was varied in percentages like 0%, 3%, 4%, and 5% by weight of cement.

3.1 WORKABILITY OF FRESH CONCRETE :

- 1. Slump Test:** The Slump test is carried out as per IS 1199-1959 and noted the slump values.
- 2. Compaction Factor Test:** The Compaction factor test is performed as per IS 1199-1959.

3.2 COMPRESSIVE STRENGTH: For the compressive strength test, the specimens of size 150 X150 X150mm were cast and tested on compressive testing machine of capacity 2000KN as per IS 516: 1959.

Compressive Strength (F) = $\frac{LA}{A}$

Where, F = Compressive strength of the specimen

(In N/mm²)

L = load (in N)

A = cross-sectional area (in mm²).

$$\text{Compressive Strength (kN/mm}^2\text{)} = \frac{\text{Crushing Load on Specimen (kN)}}{\text{Cross Sectional Area (mm}^2\text{)}}$$

Sr. No.	Grade of Concrete	Recron 3s fibre	Water cement ratio	Compressive Strength (N/mm ²)		
				7 Days	14 Days	28 Days
1.	M25	0%	0.5	15.73	21.92	26.32
2.	M25	0%	0.5	16.89	22.32	26.71
3.	M25	0%	0.5	16.12	21.67	25.70
Avg	M25	0%	0.5	16.24	21.97	26.24

TABLE 4 : Results

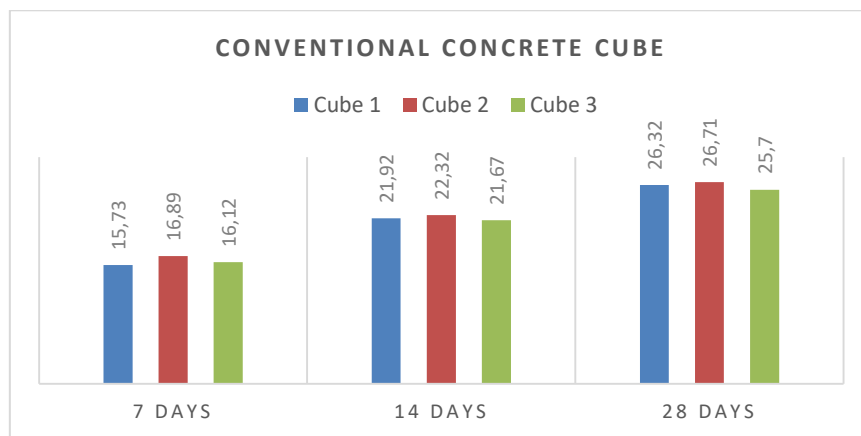


Table 5: Compressive strength test for Conventional Concrete Cube.

Sr. No.	Grade of Concrete	Recron 3s fibre	Water cement ratio	Compressive Strength (N/mm ²)		
				7 Days	14 Days	28 Days
1.	M25	3%	0.5	15.69	21.98	26.40
2.	M25	3%	0.5	16.86	22.27	26.67
3.	M25	3%	0.5	16.25	21.65	25.65
Avg	M25	3%	0.5	16.26	21.96	26.24

TABLE 6 compression test result

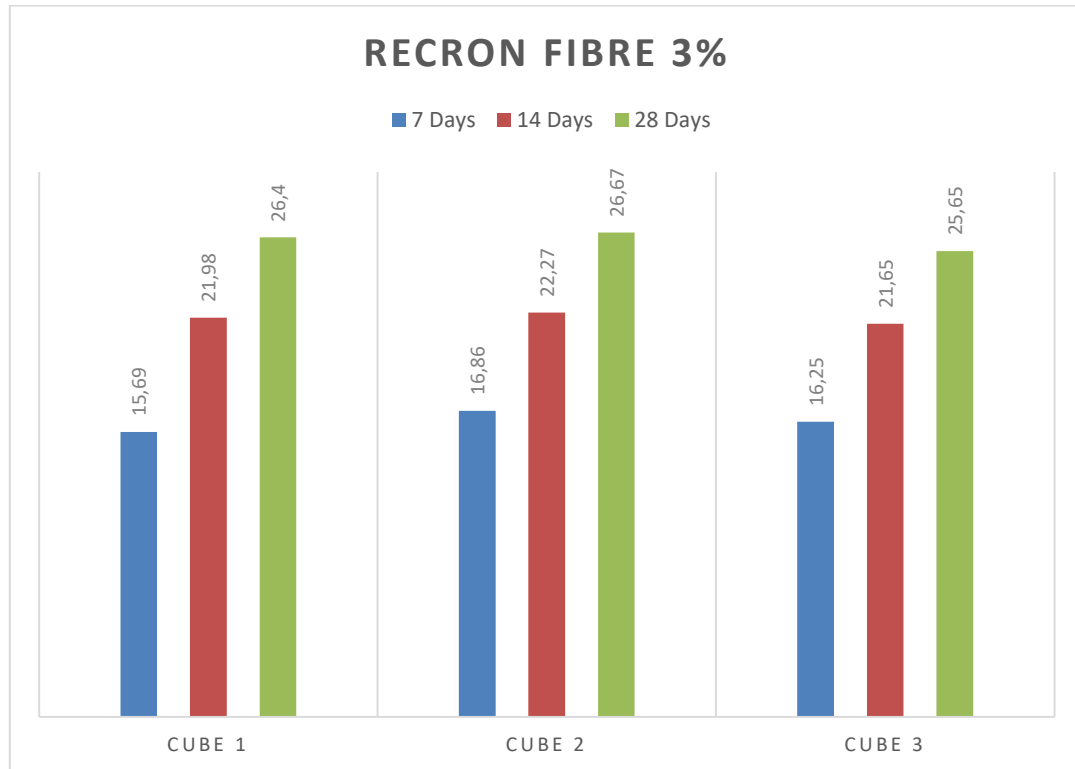


Table 7: Compressive strength test for 3%.

Sr. No.	Grade of Concrete	Recron 3s fibre	Water cement ratio	Compressive Strength (N/mm2)		
				7 Days	14 Days	28 Days
1.	M25	4%	0.5	17.42	25.915	28.70
2.	M25	4%	0.5	17.82	26.13	28.98
3.	M25	4%	0.5	17.223	26.21	28.94
Avg	M25	4%	0.5	17.48	26.05	28.87

TABLE 8: Compressive strength test

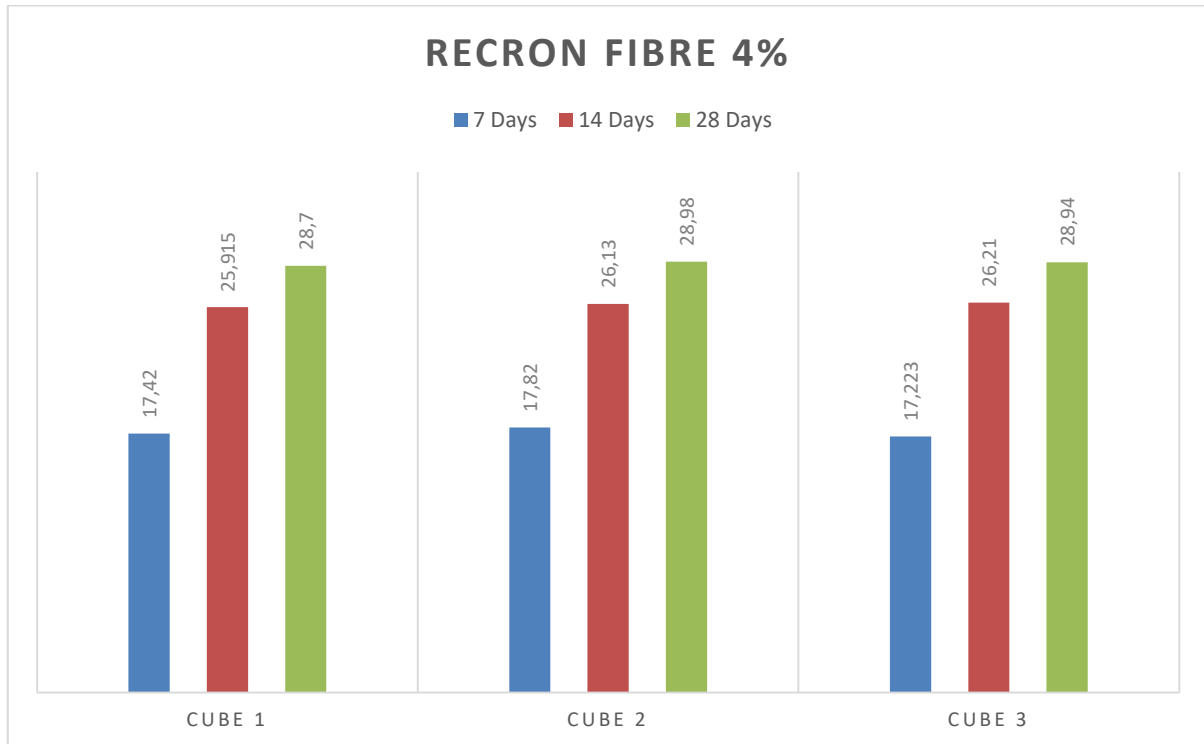


Table 9: Compressive strength test for 4%.

Sr. No.	Grade of Concrete	Recron 3s fibre	Water cement ratio	Compressive Strength (KN/mm2)		
				7 Days	14 Days	28 Days
1.	M25	5%	0.5	5.77	8.14	15.19
2.	M25	5%	0.5	6.30	7.64	14.32
3.	M25	5%	0.5	4.97	7.53	14.21
Avg	M25	5%	0.5	5.68	7.77	14.57

TABLE NO 10-compression test for 5%

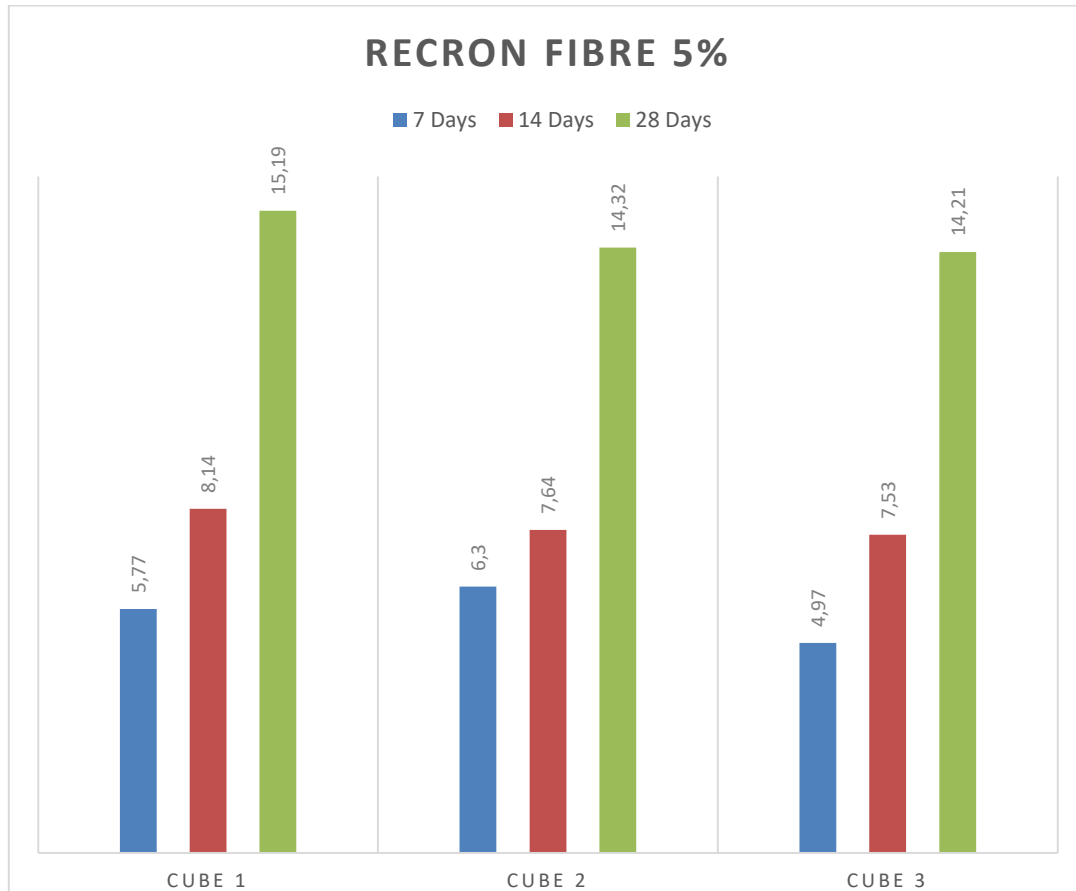


Table 11 : Compressive Strength Test for 5%.

IV. CONCLUSION

Concrete is one of the most important elements of construction field. But it's must be having a proper binding actions and economic for all sides of construction activities. Based on the investigation for various concentration of recron fibre and the concrete cured for 28 days, the following conclusions can drawn,

On addition of 3% of Recronfiber the maximum compressive strength of 26.24 N/mm² is achieved thus increase in compressive strength is 7.50 % than the conventional concrete. The increase in tensile strength is 20.15% than the conventional concrete. Thus we concluded that the optimum dosage of Recron fibre that can be added in concrete is 3%.

Fibre type	Diameter	Length	Specific Gravity	Aspect Ratio	W/C ratio	Water	Cement	Fine Agg.	Coarse Agg.
Poly Propylene (Recron 3s)	30-40 Micron	6-12 Mm	1.34-1.40	45,60 ,70 ,100	0.50	191.6 Kg/m ³	OPC 53	Passing 4.75 mm	10-20 mm

TABLE no 12:Results



Sr. No.	Particulars	Improvements
1.	Compressive Strength	16%
2.	Abrasion resistance	20-50%
3.	Toughness	15%
4.	Permeability	33-45%

Table 13: Recron 3s fibre Improvement in concrete properties by Recron 3s fibres

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