

Experimental Investigation on Slurry Infiltrated Fibrous Concrete with Crimped Fibre

P.Sampath, P.Asha

ABSTRACT--- SIFCON in our country in the movement of different structures that mentioning raised fundamentals of solidarity joined with unrivaled show and strength. SIFCON has a couple of drawing in properties, for instance, high measure and versatility. It also revealed an atypical state of adaptability as a result of which it has unavoidable soundness under outstanding, deficiency and kept stacking. Exploratory program was done to consider the introduction of SIFCON containing 10% of fiber content with different segment of Crimped Fiber (0% , 5%, 15%, 25%, 35%) The silica rage substitution is continued obvious 15% by weight of bond on the mechanical properties of SIFCON have been analyzed. As shown by the results creating of fiber volumes produces pinnacle weight.

Index Terms - SIFCON; Fiber reinforced materials; Silica fume; Admixtures; Mechanical properties; Composite; Steel fiber; Composites

I. INTRODUCTION

SIFCON is a slurry trapped stringy concrete. It joins concrete, Silicafume, fine total (\square 1.8mm),Crimped fiber, Superplasticizer and water.The execution of struck layers of steel fibers with Portland security based materials was first proposed by Haynes (1968). Lankard (1979) adjusted the framework utilized by Haynes and showed that if estimation of steel fibers in concrete cross segment could be expanded, one could grow a material with high strength properties which he pushed as SIFCON.The fiber use is 5% to 30%.Antonie E. Naaman and Joseph R. Homrich .[2] energized high or ultra-high strength concrete with especially high compressive strength respects stays in a general sense a delicate composite.The fiber volume bit of standard fiber reinforced concrete and ultra-high execution fiber reinforced concrete is regularly restricted to 1-3% Parameswaran [1] , SIFCON is pivotal development material having high strength in addition as colossal adaptability and far striking potential for fundamental applications when unconstrained weights are instructed about the focal point of affiliations . It can in like way be utilized to the genuine structure of pieces appeared to sidelong powers like breeze and shiver . Recorded as a printed structure examination of 2015 clear research has been done to build up the high execution fiber reinforced in various nation under various climatic conditions, questions, and materials, and so forward. The methodology of entered layers of steel fibers with Portland security based materials was first proposed by Haynes 1968. Lankard 1979 adjusted the procedure utilized by Haynes and demonstrated that if estimation of steel fibers in security framework could be expanded, one could get a material with high strength

properties which he submitted as SIFCON. He demonstrated the essential properties of SIFCON, for example, load-avoiding turn and very compressive strength. In any case, surrounding survey uncovers that a by no work has been done on SIFCON to control the strength qualities . The key tests are Lambardi plate alliance meter, J-Fiber entrance test . Fibers are put in parallel, converse and random to chamber viewpoint and focused the break noteworthiness of SIFCON .According to the structure audit, it has been understood that still there are different examinations on the high strength concrete (HSC), and high strength fiber reinforced concrete (HSFRC) yet here spotlights research ponders on SIFCON is particularly less. Which is driven in this examination, it is proposed to utilize steel fiber in the range 5-35% at any rate all examination paper which is compelled to 30% in before research works .

II. EXPERIMENTAL PROGRAM

2.1 Objectives of the examination

The fibers utilized in this examination is (0%, 5%, 15%, 25%, 35%)

To Find Compressive strength, split unyielding nature, Direct flexibility ,Flexural Strength

To pick the strength qualities of control blend (without steel fiber) and to pick the strength properties of SIFCON with a substitution of concrete by silica stun and plain steel fibers. The parameters concentrated are compressive strength, split versatility, direct unbending nature, toughness and vigor from Non Destructive Test (NDT) estimations of Ultrasonic Pulse Velocity (UPV) strength respects for 3D squares and chambers are concentrated to outline the strength quality [28].

2.2 Physical and mix properties of materials

It suits of tossing of squares of size a 70 X 70 X 70 mm for compressive strength, social events of 100mm estimation ,50 mm essentialness for UPV test of SIFCON viewpoints.

Table .1
The physical characteristics of ordinary port land cement

Initial setting time	32 min
Final setting time	568 min
Standard consistency	34%
Specific gravity	3.14
Fineness of cement	4.9%

Revised Manuscript Received on 14 February, 2019.

P.Sampath, Research scholar, India.
P.Asha, Professor, India.

Table 2
The characteristics of silica fume

Constituents	Quantity (%)
SiO ₂	90.04
Al ₂ O ₃	0.37
Fe ₂ O ₃	2.11
CaO	1.5
LOI	4.05
Moisture content	0.8
Carbon	1.1

Table 3
Mortar mix Proportion.

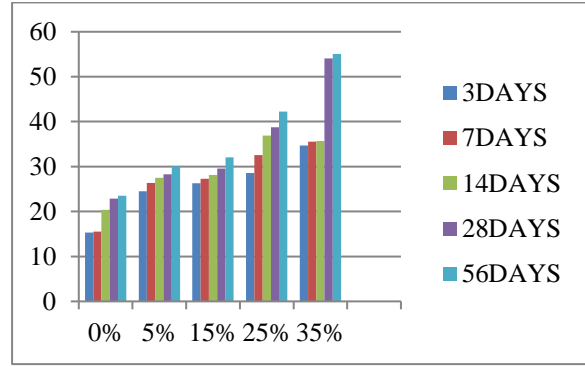
Description	Type	kg/m ³
Cement	Portland (Type)	1000
Pozzolan	Silica fume	175
Fine Aggregate	Sand (0-1mm)	835
Water	Pure	388
w/cm	-	0.33

III. COMPRESSION TEST

Weight test is the most completely observed test encouraged on set up concrete since it is an immediate test to perform and captivating characteristics properties of composites are powerfully related to this compressive strength. The mortar of concrete and sand is set up in the degree as 1:0.711. water to cover degree is 0.33. The mortar set in molds having sorts of 3D shapes with side as 70mm [4]. The mortar, in the wake of being set in molds, is compacted in vibrating machine for 2 minutes. The perspectives are ousted from the molds and they are submerged in clean water for reestablishing. The shapes are tested at 3 years of age days, 7 days, 14 days, 28 days, 56 days and 90 days

The compressive strength at all immense heaps of PMSF35 fibered composites are higher than the various fiber substitution composites and control mix. The greatest compressive strength for PMSF35 at 28 days regard is 42.08MPa. The compressive strength plan at 28 days of reestablishing of SIFCON 3D shape models are for 0%, 5%, 15%, 25% and 35% are

%FIBRE	3DAYS	7DAYS	14DAYS	28DAYS	56DAYS
0%	15.3	15.51	20.4	22.85	23.5
5%	24.48	26.37	27.5	28.3	30.08
15%	26.28	27.3	28.16	29.59	32.05
25%	28.57	32.56	36.87	38.77	42.24
35%	34.69	35.51	35.71	54.08	55.05

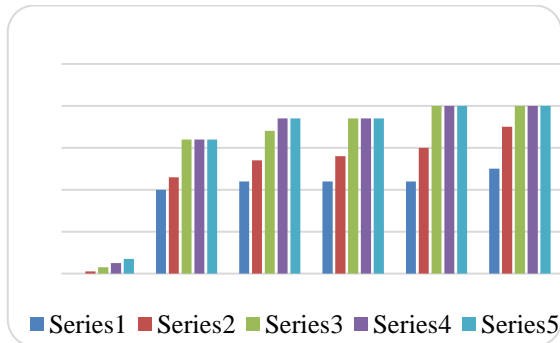


IV. ULTRASONIC PULSE VELOCITY TEST

In this test procedure, the ultrasonic heartbeat is passed on by the transducer which is held in contact with one surface of the solid part under a test. Happening as expected to inquiring about a known way length (L) in the solid, the beat of vibrations is changed over into an electrical sign by second transducer held in contact with different surfaces of the solid part and an electronic building circuit connects with the headway time (T) of the beat to be assessed. The beat speed (V) is given by $V=L/T$ (km/s). Bond is term of consistency, occasion or nonappearance of inside flaws, parts and division, and so forth specific of the section of workmanship utilized, would subsequently have the choice to be evaluated utilizing the gauges given in the table underneath which have been advanced for portraying concrete in structures concerning the ultrasonic heartbeat speed. The energetic adaptability at 28 days that demonstrates an estimation of 4.1MPa with PMSF 35% of steel fiber. The toughness estimation of ultrasonic heartbeat speed respect is 5.7km/s for 3D square and 7.5km/s for chamber following to including PMSF 35% of steel fiber, from this time forward the outcome is astounding for durability. Based on the examination completed, the interfacing in quality concerning control blend is about 1.2 occasions for compressive quality, on different events for split persistent nature, on various events for direct assurance, 1.3times for ultrasonic heartbeat speed in 3D square, 2.3times for ultrasonic heartbeat speed in chamber. As necessities be it is recognized that 35% use of plain smooth steel fiber gives amazing quality in cement for a wide level of tests.

UPV Cube Semi Direct test given below

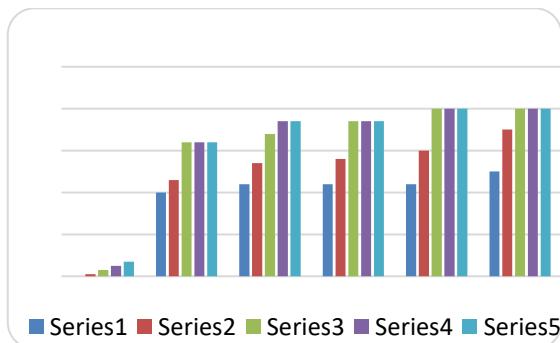
	3 days	7 days	14days	28 days	56 days
0%	2	2.2	2.2	2.2	2.5
5%	2.3	2.7	2.8	3	3.5
15%	3.2	3.4	3.7	4	4
25%	3.2	3.7	3.7	4	4
35%	3.2	3.7	3.7	4	4



UPV Cube Semi Direct Test chart

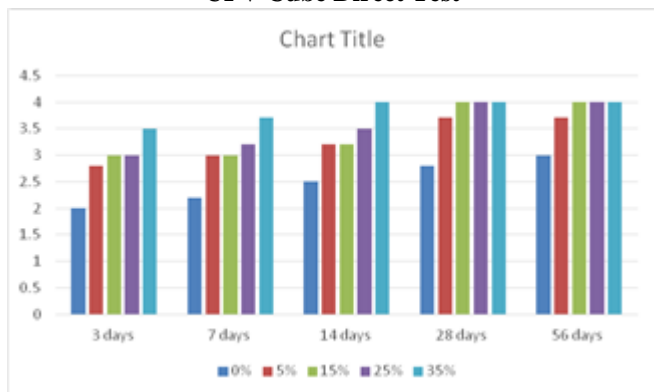
UPV Cube Direct Test

	3 days	7 days	14 days	28 days	56 days
0%	2	2.2	2.5	2.8	3
5%	2.8	3	3.2	3.7	3.7
15%	3	3	3.2	4	4
25%	3	3.2	3.5	4	4
35%	3.5	3.7	4	4	4



UPV Cube Semi Direct Test chart

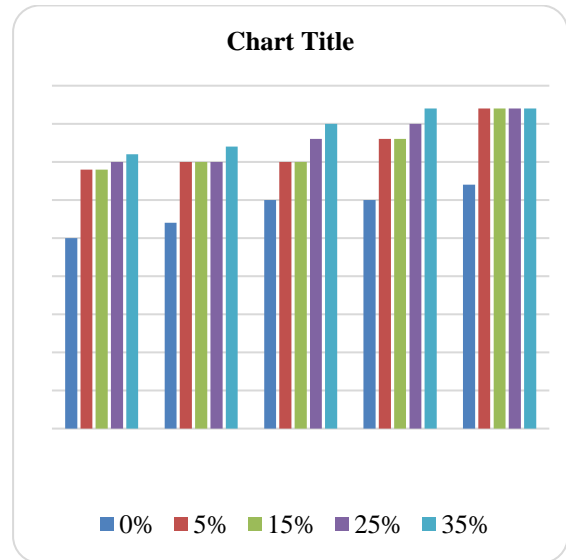
UPV Cube Direct Test



UPV Cube Direct Test

UPV Cylinder Direct Test given below

	3 days	7 days	14 days	28 days	56 days
0%	2.5	2.7	3	3	3.2
5%	3.4	3.5	3.5	3.8	4.2
15%	3.4	3.5	3.5	3.8	4.2
25%	3.5	3.5	3.8	4	4.2
35%	3.6	3.7	4	4.2	4.2



UPV Cylinder Direct Test chart

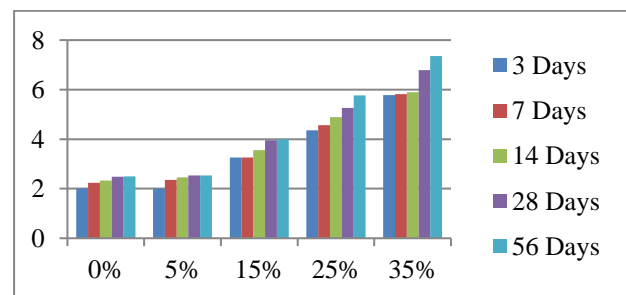
V. RESULTS & DISCUSSIONS

The mortar put in molds having sorts of chambers with size as 75mm segment crosswise over completed and 150 mm stature. The mortar, in the wake of being set in molds is compacted in vibrating machine for 2 minutes. The models are ousted from the molds and they are submerged in clean water for reestablishing. The 3D squares are then tried in weight testing machine close to the completing of 3 days, 7 days, 14 days, 28

days, 56 days and 90 days.

The split versatile characteristics at all days for the 35% fibered bond are higher than the various fiber substitution bond and control mix. The most phenomenal split bendable quality for PMSF35 fibered concrete at 28 days regard is 5.7MPa.

% Fiber	3 Days	7 Days	14 Days	28 Days	56 Days
0%	2	2.24	2.33	2.48	2.5
5%	2	2.36	2.46	2.54	2.54
15%	3.26	3.26	3.56	3.96	4
25%	4.36	4.56	4.89	5.26	5.77
35%	5.78	5.82	5.89	6.79	7.36



Split tensile test graph



VI. CONCLUSION

By understanding suitable part of plain steel fibers of 0%-35% with lacking substitution of bond by silica fume in different volumes, the mechanical properties can be redesigned. Widening the component of fiber in strong extensions compressive quality, split versatility, and solidness of SIFCON did. The compressive quality at 28 days that exhibits the fiber results most essential regard 42.08MPa with the additional substance of plain smooth steel fiber PMSF35.

REFERENCES

1. V. S. Parameswaran, T. S, Krishnamoorthy, K. Balasubramanian, and SanthiGangadar, "Studies on Slurry-Infiltrated Fibrous Concrete (SIFCON), Transportation Research Record 1382.
2. Antonie E. Naaman and Joseph R. Homrich, "Tensile Stress-Strain Properties of SIFCON", ACI Materials Journal, V. 86, No.3, May- June 1989.
3. Sharma H. K. 'Moment capacity of high performance slurry infiltrated fibrous concrete plates' et al (2007)
4. Ferrara L., Park Y. D. and Shah S. P. 'The role of fiber dispersion on toughness and deflection stiffness properties of SFRCs'. (2007)
5. I.S. 650- 1966, Specification for standard sand for testing of cement.
6. I.S. 2386 (Part-1) - 1963, Methods of test of aggregate for concrete, part 1 particle size and shape.
7. I.S. 2386- (Part3 and Part 4) 1963, Methods of test of aggregate part 4 Mechanical Properties.
8. I.S. 2386- (Part 4) 1963, Methods of test of aggregate for concrete.
9. I.S. 5816-1999, Method of test for splitting tensile strength of concrete cylinders.
10. I.S. 516: 1959, Methods of test for strength of concrete. I.S. 456-2000, Code of practice for plain and reinforced cement concrete for general building construction