A Comparison on Strength Parameters of Different Types of Fibre Reinforced Concrete

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Abstract

In this paper an undertaking is made to present the conceded consequences of a test examination did on hairfibre made concrete and Lathe fiber kept up with concrete. We have taken steel fiber from machine studio and hair fiber for this survey. Fiber content was separated from 1%, 2%, 3% and 4% by weight of cement. Effects of the expansion of these strands on the set properties of concrete were examined in M40 grade of concrete. The characteristics considered for assessment are compressive strength, split pliable and flexural strength. States of size 150 mm for compressive strength; light radiations 100 mm x 100 mm x 500 mm for flexural strength; work environments of 150mm width and 300mm length for split determination, were used as express depictions. The aggregate of the models were water diminished for 7, 14 and 28 days and tried as needs be.

I. Introduction

Various fibrous materials, both natural and manmade have been used and are being used as building materials. To develop the properties of concrete, fibers have been used for the past few decades. In this project work human hair samples, lathe fibre waste obtained from lathe are used to find about the possible use of those fibres in concrete to improve the hardened concrete properties. Fibres were added in certain proportions to the weight of the cement and the strength Parameters obtained from both the fibres were analysed. To zero in on the strength grouping in concrete on augmentation of filaments as for Compression, Splitting squeezing variable and Flexure and track down the best level of advancement of fiber

Jain D. moreover, Kothari focused on the Hair has a high flexibility which is identical to that of a copper wire with similar expansiveness. Hair, a non-degradable matter is making a characteristic issue so its usage as a fiber supporting material can restrict the issue. It is similarly open in riches and at an extraordinarily negligible cost.

Yadollah Batebi , Alireza Mirzagoltabar focused on sulfur is the essential clarification of fortitude of hair. Utilizing these fibers in generous blend may extend considerable convenience and decreasing shrinkage breaks. Man waste hair is used as strands. With developing strands inside the generous its unbending nature unquestionably increases.

Sanjay Choudhry and Bhawana Pandey discussed the hair fiber which is made of primarily keratin protein with on a very basic level alpha-helix structure. Generally 91%of the hair is protein contained long chain of amino destructive. The Cortex keratin is responsible for this propriety and its long ties are compacted to shape a standard plan which, other than being strong, is versatile

II. Materials Used & Mix Design

Lathe Waste

In this study, steel scrap available from local lathe workshops of ununiform thickness and sizes in random are used as fibers in concrete in required percentage by weight of cement. Aspect ratio of the fibre used is the important factor in fibre reinforced concrete as it influences the properties and behavior of concrete.

Hair Fibre

Normally hairs having tensional strength like steel, so we investigated whether human hair has the ability to increase the tensional strength of the concrete. Hair, a non-degradable matter is making a natural issue so its usage as a fiber supporting material can restrict the issue. It is similarly available in abundance and at an amazingly negligible cost.

Fine Aggregate

Fine absolute used for substantial mortar should be fittingly assessed to give least void extent and be freed from malevolent materials like earth, cut substance and chloride spoiling, etc, Grading of fine complete should be with the ultimate objective that it doesn't cause development in water interest for the generous and should give most outrageous voids so the fine cementitious particles compensate for the inadequacies

Coarse Aggregate

Locally available blue metals were used. Crushed stone stones of size going through 20mm sifter and hung on 4.75 mm sifter as indicated by IS: 383-1970 was used for exploratory purposes

Concrete

The substantial used in this audit was normal Portland concrete (OPC) Ultra Tech, 53 grade.

Water

Water is a critical component of concrete as it falsely participates in the reaction with cement to shape the hydration thing, C-S-H gel.

Mix Design

The Concrete mix degrees M40 took on was 1:1.26:2.15 (concrete: sand: coarse aggregate) with water a substantial extent of 0.4. The considerable mix was arranged to achieve block strength of 40 MPa (28 days). The mix degree is found by insinuating IS 469-2009.

III. Test Results & Discussion

3.1 Compressive strength

Lathe waste and hair fibre were added in percentages of 1,2,3 and 4 to concrete. The fibre were added to the concrete while mixing. Specimens are casted for M40 grade concrete, water preserved and Tested at 7,14 and 28 days. Test outcomes are summarised below to compare the compressive strength obtained from lathe waste as well as hair fibre .

Table 1. Comparison of Compressive strength from Lathe waste fibre and hair fibre

% Addition of fibre to M40 Grade Concrete	Compressive strength @ 7 Days		Compressive strength @ 14 Days		Compressive strength @ 28 Days	
	Lathe	Hair	Lathe	Hair	Lathe	Fibre
0%	23.24	23.24	31.54	31.54	40.12	40.12
1%	24.56	25.16	32.89	32.96	41.75	42.64
2%	25.67	26.54	33.11	34.10	42.23	43.94
3%	26.49	27.68	34.29	35.66	43.56	44.78
4%	25.12	25.89	33.66	34.74	42.27	43.15

From the results we can infer that 3% addition of both lathe waste fibre and hair fibre provides best results. Beyond 3% addition of fibre the compressive strength gets decreases. Comparing the results from both the fibres, Hair fibre concrete provides better result than concrete with lathe fibre. 3 % addition of hair fibre provides 11.65% increase in compressive strength when compared with the conventional specimen.

3.2 Split Tensile strength

Direct inflexibility of concrete not actually settled owing to inconvenience in arranging of test model and applying a truly center point malleable weight. This test is an indirect strategy for finding the flexibility of concrete. The spilt not actually settled using generous offices of 150 mm distance across and 300 mm long. The test delayed consequences of various degrees of machine fiber and hair fiber for 7, 14 and 28 days in M40 grade concrete are given under.

Table 2. Comparison of Split Tensile strength from Lathe waste fibre and hair fibre

% Addition of fibre to M40 Grade Concrete	Split Tensile strength @ 7 Days		Split Tensile strength @ 14 Days		Split Tensile strength @ 28 Days	
	Lathe	Hair	Lathe	Hair	Lathe	Fibre
0%	3.24	3.24	3.54	3.54	4.00	4.00
1%	3.26	3.46	3.89	3.96	4.25	4.34
2%	3.37	3.50	4.01	4.10	4.35	4.64
3%	3.49	3.68	4.29	4.66	4.56	4.98
4%	3.12	3.29	3.66	3.74	4.07	4.15

From the above results it is evident that both lathe fibre and hair fibre provides results which are not of bigger difference but hair fibre provides slightly better results than lathe fibre in M40 grade concrete. 3% addition of hair fibre provides 24.5% increase in strength when compared with the conventional one.

3.3 Flexural Strength

For Flexural strength test, the example was set in UTM, in such a way that heap will be applied to the upper generally surface, as cast in the form, along two lines separated L/3 separated. The waste fibre and hair fibre were added in certain proportions and tested at 7,14 and 28 days.

Table 3. Comparison of Flexural strength from Lathe waste fibre and hair fibre

% Addition of fibre to M40 Grade Concrete	Flexural strength @ 7 Days		Flexural strength @ 14 Days		Flexural strength @ 28 Days	
	Lathe	Hair	Lathe	Hair	Lathe	Fibre
0%	3.82	3.82	4.30	4.30	4.97	4.97
1%	3.90	4.06	4.46	4.76	5.12	5.40
2%	4.15	4.24	4.97	5.18	5.21	5.47
3%	4.30	4.57	5.20	5.56	5.30	5.68
4%	4.12	4.26	4.30	4.67	4.47	4.75

Comparing the flexural strength results obtained from hair fibre and lathe scrap fibre optimum percentage of addition of fibre is proved to be 3% and hair fibre provides better results. There is 14.5% increase in strength in addition of 3% hair fibre to the conventional M40 grade concrete.

IV. Conclusion

Lathe waste scrap fibre as well as hair fibre is available in plenty as waste materials. They not only pollute the earth but is tedious to find the suitable alternate use of the materials. In our project we have used both the fibres are added in percentages of 1, 2, 3 and 4 and from the results obtained it is evident that both the materials improve strength of concrete. Hair fibre provides better results at 28 days curing when compared to lathe waste scrap fibre. However hair fibre has the tendency to degrade in longer span, so it is suggested to continue the research at 56 and 90 days curing and also it is necessary to carry out durability tests to find the effective use of Hair fibre in concrete.

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