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Research Paper

"An Experimental Study of Partial Replacement of Cement by Basalt Fibre in High Strength Concrete"

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ABSTRACT: *The replacement of cement to increase its strength is majorly taken into consideration. This project is aimed to partially replace cement with basalt fibre later continued by testing its compressive strength for 7th and 14th day. M53 grade cement is been used in this project to partially replace basalt fibre to certain percentages (0% , 5%, 10% & 15%). The result are compared with each other and graph is drawn to conclusion.*

Key Words: *Basalt Fibre, Replacement, High strength Concrete*

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I. INTRODUCTION

This project aims at replacing cement with basalt fibre as it reduces the permeability of the concrete and improves the mechanical performance of the concrete. It reacts with cement paste to form strong CSH which provides higher strength and reduces bleeding. In this paper we discuss the behavior and physical properties of 5%, 10% & 15% of Basalt fibre in concrete by replacing the cement and comparing the results with conventional concrete (0%) and study the characteristic strength i.e., compressive strength and of different proportion Basalt fibre in concrete and comparing the result with conventional concrete.

II. METHODOLOGY

The materials used in this mix designing are cement (OPC) of 53 grade confirming to IS: 12269-1987 (9), coarse aggregate (20mm passing), fine aggregate (river sand), basalt fibre and portable water are tested for simpler parameters. Mix design is designed as per the guidelines specified in AC1234R -96 "Guide for the use of Basalt fibre in concrete" by ACI committee 234. Cubes are cast and cured for 7 and 14 days which are tested for compressive test on those respective days.

III. TESTING OF CUBES (IS CODE: IS516-1959)

In this experimental investigation, Basalt fibre concrete cubes are used for testing compressive strength.The cubes prepared were tested in compressive testing machine. The specimens were tested at an age of 7 and 14 days after casting in compression testing machine of 200 tons capacity under the uniform rate I loading at 140 kg/cm/min and compressive strength are calculated as per IS:516-1959. The load at which thecontrol specimen ultimately fail is noted, compressive strength is calculated by dividing load by area of specimen.

The figure 3 shows the apparatus for compressive strength testing.

$$f_c = P/a \quad (d)$$

Where f_c = cube compressive strength in N/mm^2

P = cube compressive load causing failure in KN

a = cross sectional area of cube in mm^2

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IV. RESULTS

- The Compressive strength of M53 for 7 days

Mix (%)	Load (KN)	Compressive Strength(N/mm²)
0	796	35.4
5	630	28.0
10	320	14.2
15	280	12.4

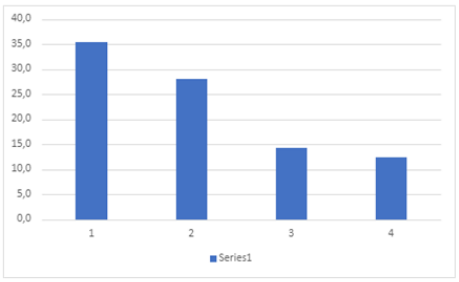

Table: 1 and Graph; Showing compressive Strength of M53 for 7 days

- The Compressive strength of M53 for 14 days

Mix (%)	Load (KN)	Compressive Strength(N/mm²)
0	1090	48.4
5	500	22.2
10	450	20.0
15	390	17.3

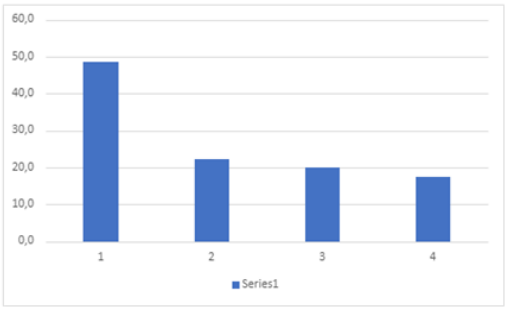

Table:2 and Graph; Showing compressive Strength of M53 for 14 days.

V. CONCLUSION

The results show that basalt fibre even after being advantageous material doesn't increase the strength of concrete when replaced with cement then conventional concrete, but to 10% replacement shows better results than rest of percentage of replacements.

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