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Experimental Investigation On Steel Fiber Concrete Using Plastics

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Abstract: **This paper presents experimental behaviour of steel fiber (lathe waste) and plastics in concrete. In this experimental study the total of 36 numbers of concrete cubes and cylinders added with plastic and lathe are tested, by keeping lathe waste percentage as constant as 1.5% and the percentage of plastic varies at 0%, 0.2%,0.4%,0.6%,0.8%,1% to the weight of concrete to examine compressive strength and splitting tensile strength. The experimental study indicates that the addition of plastics at the range of 0.2% to 0.4% improves the compressive strength and at the range of 0.6% to 0.8% improves the splitting tensile strength of lathe waste concrete.**

Keywords: **Information lathe waste concrete, plastics, compressive strength, splitting tensile strength**

I. INTRODUCTION

Since plastic bags are non-biodegradable, it creates lot of environmental problems. If plastics are buried in landfills, it doesnot allow the rainwater to drain also the harmfull chemicals are released into the under ground and destroy the underground water. A plastic bag takes around one thousand years to decompose completely. Hence the attempt has been made in the present paper to study the experimental behaviour of these waste polyethylene bags varies at 0%, 0.2%,0.4%,0.6%,0.8%,1% of total weigth of concrete to 1.5% of lathe waste concrete. Raghatate Atul[1] studied on polyethylene bags on concrete improves the tensile strength but the tensile strength are affected may be due to reduction of bonding. Kumaran and Nithi [2] presented the Effect of Lathe Waste in Concrete as Reinforcement with compressive and split tensile strength increase at the range of 1.5% to the weigth of concrete. RajPrasad and Anuradha [3] conduct experimental research on Fibre Reinforced Concrete using Waste Materials. Manikandan and Senthamilkumar[4] examined the compressive strength of concrete using plastic waste. Sivaraja and kandhasamy[5] investigate the mechanical characteristic of fibrous concrete with waste rural materials.

II. MATERIALS

Materials used are Portland pozzolonic cement, fine aggregate from river sand, coarse aggregate from crushed rock, lathe waste and polyethylene

A. *Cement*

Cement used are Portland pozzolonic cement. Various test were done and results are discussed below

TABLE 1
PROPERTIES OF CEMENT

Physical properties	Results
fineness	2.65%
Normal consistency	33%
Initial setting time	210min
Final setting time	330min
Soundness	1.6mm
28 days compressive strength	55mpa

B. Fine aggregate

Natural river sand are used as fine aggregate, various tests are discussed to find out the properties and the test results are discussed below

TABLE 2

PROPERTIES OF FINE AGGREGATE

Physical properties	Results
Specific gravity	2.6
Fineness modulus	2.75
Water absorbtion	1%
Bulk density	1550.8kg/cu.m

C. Coarse aggregate

Crushed rocks with maximum 20mm aggregates are used as coarse aggregate. The properties of the coarse aggregate found out are discussed

TABLE 3
PROPERTIES OF COARSE AGGREGATE

Physical properties	Results
Specific gravity	2.8
Fineness modulus	7
Aggregate impact value	14%
Aggregate crushing value	25%
Water absorbtion	1%

D. Plastics

Polyethylene bags used for carrying goods are cut in to pieces are added to the concrete.

fig 1 plastic fiber used in concrete

E. Lathe waste

When shaping the pieces of steel, wood or other materials lathe machine creates waste, this created steel waste can be used as steel fiber.

Fig 2 Lathe waste as steel fiber

F. Super plasticizer

CONPLAST SP 430 was used to improve the workability and durability.

G. Water

Portable water obtained from laboratory used for mixing and curing which satisfies the drinking strandards are used.

III. CONCRETE MIX DESIGN

In this experimental study M20 grade concrete mix as per IS: 10262-2009 is used. The mix proportion are 1:1.5:2.5 and water cement ratio is 4.5.

Fig 3 Concrete blocks mixed with plastic fiber and steel lathe

IV. TESTING

A. Compressive strength

For finding the compressive strength of concrete, cube size of about 15cm*15cm*15cm were moulded. In saturated surface dried condition cubes were tested. Till the specimen reaches ultimate load, the loading was continued. Compressive strength at 7, 14,28 days are tabulated.

TABLE 4
Compressive strength N/mm^2

% of plastics	0%	0.2%	0.4%	0.6%	0.8%	1%
7days	35.4	37.2	34.9	33.6	32.25	30.3
14days	39.8	42.3	40.4	37.23	36.3	34.1
28days	44.7	47.7	48.3	43.9	40.1	38.5

B. Split tensile strength

For finding the tensile strength of concrete, cylinder of size 150mm in diameter and 300mm long were moulded. In saturated surface dried condition cylinders are tested. Tensile strength at 7,14,28 days are tabulated

TABLE 5
Split tensile strength N/mm^2

% of plastics	0%	0.2%	0.4%	0.6%	0.8%	1%
7days	1.98	2.14	2.64	3.03	3.42	4.31
14days	2.28	2.43	3.52	3.87	4.24	4.63
28days	3.42	3.72	4.08	4.92	5.04	4.81

V. RESULTS AND DISCUSSION

A. Compressive strength

7,14,28 days compressive strength are tabulated in table 4. Improvement of compressive strength at the rage of 0.2 to 0.4% of plastic in concrete is observed.
The strength may be increased by adding more percentage of lathe waste to the concrete.

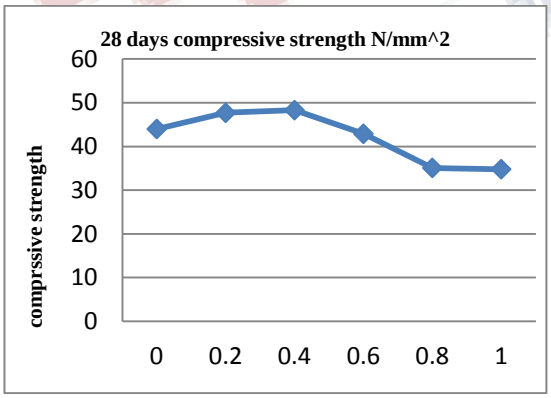

Fig 4 variation of compressive strength with varying plastic percentage

B. Tensile strength

7,14,28 days tensile strength are tabulated in table 5. Improvement of tensile strength at the rage of 0.6 to 0.8% of plastic in concrete is observed.

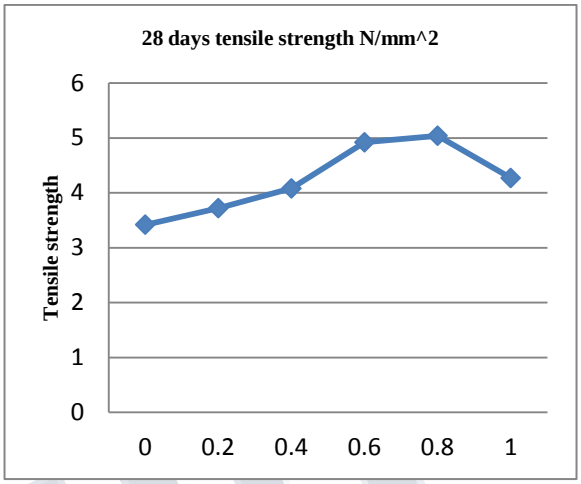

Fig 5 variation of tensile strength with varying plastic percentage

VI. CONCLUSION

Based on the Experimental results which regard to the effect of plastic on the properties of concrete are followed

1. Improvement of compressive strength from the range of 0.2 to 0.4% of plastic along with lathe in concrete is observed
2.The splitting tensile strength observation shows the improvement of tensile strength of concrete from the range of 0.6 to 0.8%

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