EXPERIMENTAL INVESTIGATION ON UTILIZATION OF RECYCLED CARPET NYLON FIBRE IN CONCRETE

SREE RANJINI ANZAL.A NISHAL.MK MUHAMMED SAINUL ABID.T RISHAL.KP

Asst professor Dept of Civil Engineering JCT college of Engg and Tech, Coimbatore, Tamilnadu.

UG students Dept of Civil Engineering JCT College Of Engg And Tech, Coimbatore, Tamilnadu

ABSTRACT

The primary aim of our project is to investigate the strength behavior of nylon fiber compared to the conventional concrete by testing the compressive, split tensile and flexural strength of the cube, cylinder and prism respectively. The cubes, cylinders, prisms are casted by adding nylon in different percentages. We allowed IS method for mix proportioning and the mix proportion obtained as per IS: 10262-2009 is 1: 1.66: 1.82: 0.45. The nylon is added in concrete at 0%, 1%, 2%, 3%. Totally 72 moulds are casted (cube, cylinder, prism) for 7, 14, 28 days curing in order to find out the optimum percentage nylon in concrete. After 28 days compressive strength was found out from cubes, split tensile strength from cylinders and flexural strength from prism. We get result in increase of strength in 1% adding nylon

Keywords- Cement, Fine aggregate, Coarse aggregate, Nylon fiber, Increase Durability, Minimize the cracks.

I. INTRODUCTION

Plain cement concrete has some short comings like low tensile strength, limited ductility and little resistance to Cracking. The cracking may due to Economic structural, environmental factors but most forms due To internal micro cracks. To overcome these deficiencies extra materials are added to improve the performance of Concrete. Fiber reinforced Concrete research work on FRC during last two decades has established that addition of various types of fiber such as nylon, polypropylene and steel etc. in plain concrete Improves strength and increase overall performance. The beneficial of nylon is to arrest the propagation of micro cracks the main objective of this project is to investigate the utilization of the carpet fiber in concrete and to determine the compressive, split tensile and flexural strength of the concrete while compared to Conventional concrete. To determine the compressive Strength of carpet fiber concrete. To determine the split Tensile strength of carpet fiber concrete.

MATERIAL PROPERTIES

MATERIALUSED

Cement, Coarse aggregate, Fine aggregate, Nylon fiber, Water

CEMENT

Locally available Ordinary Portland cement (OPC) of 53grade has been 0used physical properties Are mentioned.

COARSE AGGREGATE

Locally available crushed stone aggregates are used which have the size of 20mm used for the compared to demolished concrete aggregate.

FINE AGGREGATE

Sand was collected from nearby river zone-III is used as fine aggregate is passed through the sieve of 4.75mm. IS 383 (1970) is followed for fine aggregate. The various properties of sand are tabulated.

NYLON FIBER

Nylon is generic name that identifies a family of Polymers. Nylon fibers are imparted by the base polymer type, addition of different levels of additive, manufacturing condition and fiber Dimensions. Currently only two types of nylon fiber are Marketed for concrete. Nylon is heat stable, hydrophilic, relatively inert and resistance To a wide variety of materials. Nylon is particularly effective imparting impact resistance and flexural

Toughness and Sustaining and increasing the load carrying capacity of concrete following first crack.

PROPERTIES OF NYLON FIBER

Material	100% virgin fiber
Tensile strength	130-140ksi
Modulus (young's)	750ksi
Melt point	435 F (225 C)
Chemical resistance	Good
Alkali resistance	Excellent
Acids and salts resistance	Good
Electrical & thermal conductivity	Low
Fiber length	¾"
Form	Monofilament
Color	White

WATER

Water cement ratio (w/c) of 0.45 was used in the purpose portable water used for mixing and curing purpose.

II. EXPERIMENTAL METHODOLOGY

The concrete mix design was done in accordance IS:10262 (1982). In this project M30 grade are used the mix ratio is 1:1.66:1.82. By using this proporitionh value, the volume of cement, fine aggregate, and coarse aggregate are estimated. The Ordinary Portland cement (OPC 53 GRADE), Good stone aggregate and natural sand of Zone III was used as coarse aggregate and fine aggregate. For this study cubes (150×150×150mm), Cylinder (150mm dia& 300 mm height) and prism (100×100×500mm) were casted by using Nylon fiber (0%,1%,2%). Then further tested are conducted such as workability then it will be casted.

III. Material Test Result

- **CEMENT**
  OPC 53 grade
  Specific gravity = 3.15
  Water cement ratio = 0.45
- **FINE AGGREGATE**
  Sieve = 4.75mm passing
  Specific gravity = 2.60
- **COARSE AGGREGATE**
  Sieve = 12.5mm retaining Specific gravity = 2.64

MIX RATIO:

Cement	Fine aggregate	Coarse aggregate	W/C Ratio
792.48 Kg	871.72 kg	214.65 kg	0.45
1	1.7	2	0.45

IV. CURING OF CONCRETE

Casting of concrete after the completion of 24 hours. mould will be removed then cured by using portable water. The specimen is fully immersed in portable water for specific age 7, 14, 28, days. After the completion of curing it will be tested.

V. TESTING OF HARDENED CONCRETE

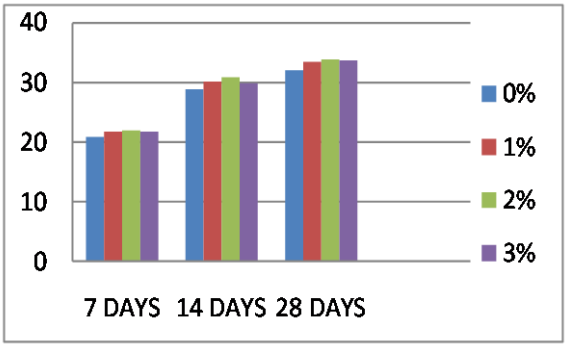
1. Compressive strength test.
2. Split tensile strength test.
3. Flexural strength test.

1. compressive strength Test result

The compressive strength is determined by dividing the maximum of failure load of the specimen during the test by the cross-sectional area of the specimen. The normal concrete and the percentage of replacements in special concrete are crushed at different days (7, 14, 28 days) are show in table & graph details. Compressive strength = $\frac{P}{A}$ (N/mm²)

SI.NO	NYLON FIBRE	7days	14days	28days
1	0%	20.87	28.89	32.10
2	1%	21.79	30.2	33.52
3	2%	21.96	30.9	33.9
4	3%	21.76	29.9	33.7

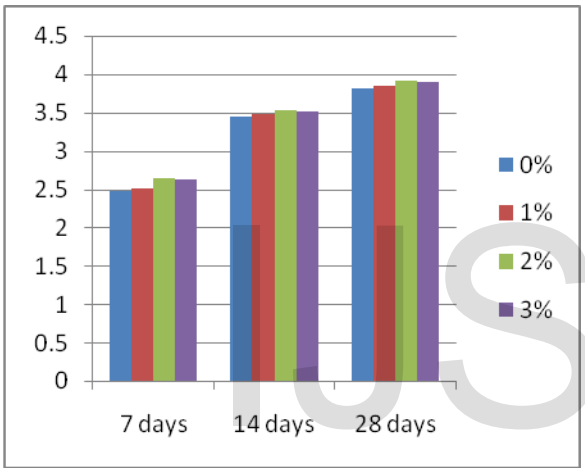
Graphical representation of compressive strength



Flexural strength = $\frac{3Pa}{bd^2}$ (N/mm²)

SI.NO	NYLON FIBRE	28 DAYS N/mm²
1	0%	5.2
2	1%	5.34
3	2%	5.4
4	3%	5.37

Graphical representation of split tensile strength



Graphical representation of flexural strength

2. Split Tensile Strength Test Result

2. Split □⚜Ⓢ⚜ⓜ⚜◎⚜┼⚜╟⚜╢⚜╤⚜◘⚜A

A measure of the ability to resist a force that tends to pull it part. It is expressed as the minimum tensile stress needed to split the material ap art. IJS E IJSE

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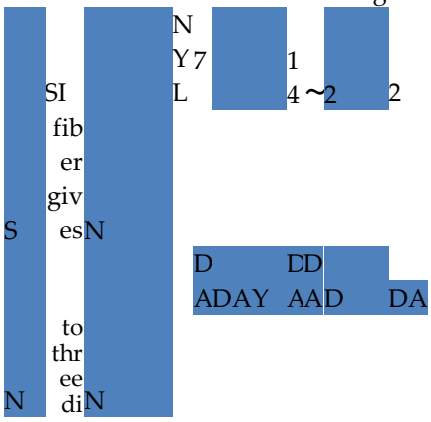

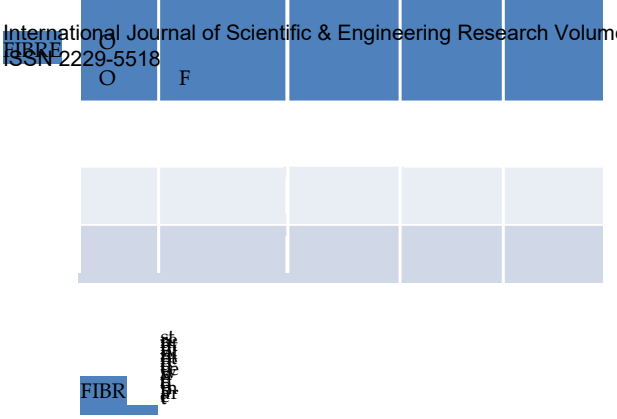

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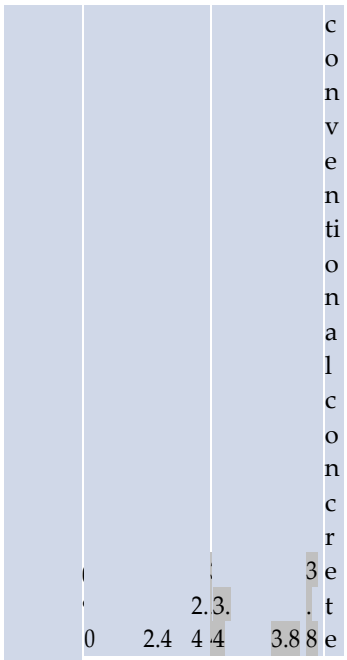

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3	2	22	2.63	3.53		3.91 1	
4	3%	2.63	3.51	3.89			

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