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A Replacement of Fiber Base Waste Fishnet Sheets To Asbestos To Minimize Environmental Impact

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Abstract - *A possible method for using the fishnet as Reinforcement to made up cement mortar sheet. In preliminary investigation, mechanical properties of mortar containing nylon fishnet as reinforcement are evaluated. In this study, Waste nylon fishnet is used as reinforcement in mortar. Addition of nylon fishnet has led to a decrease compressive strength of mortar. On the other hand the addition of nylon Fishnet improves some of the properties of mortar like load carrying capacity. The fishnet reinforced sheet is economical and harmless to environment. Although further studies are necessary it appears that the incorporation of nylon fishnet as reinforcement could be beneficial to increase load carrying capacity and flexural strength.*

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I. INTRODUCTION

In this fishnet reinforced sheet, fishnet is used as the reinforced sheet in cement and sand mortar which is alternative to asbestos cement sheet.
As fishnet is elastic material hence when the sheet is carrying a load, the stress is developed is not exceeded allowable stress. The stress and strain are linear at working load condition.

1.1 Information about Nylon: -

Nylon is synthetic fibre made from petroleum product. It was developed in the 1930 as alternative to silk. Nylon is valued for its light weight incredible tensile strength, durability and resistance to damage. It has a very slow decay rate.

Nylon is strong, light synthetic fibre. Nylon thread is made from the polymerization of an amine and an acid chloride. The thread is lifted from the interface of two immiscible liquids. Nylon is synthetic polymer, plastic invited on 28 Feb 1935 by Wallace Carothers at DuPont of Wilmington, Delaware USA. The material was announced in 1938 Nylon fibres are now use to make many synthetic fabric and solid nylon is used as engineering material

1.2 Materials selection and process

- In this project, we prepared a sheet called as a Fishnet sheet which will act as an alternative to asbestos cement sheet.
- We made a Prototype model of the fishnet sheet.
- Initially, we selected the materials like cement, sand, aggregate and replaced this materials with soil, brick powder, black cotton soil, etc. and carried out different tests on it such as compression test, etc and interpreted the results and from this results we found that this fishnet sheet is very less effective in strength or load carrying parameter.
- So, to solve this problem, we made changes in materials and then, we prepared the model (prototype) again and repeated the test and after interpreting the result, we saw that this fishnet sheet is moderately giving better result in strength

II. MATERIAL REQURIMENT

Various materials involved in experimental study are given as follows:

1) Cement:

OPC 43 grade cement with initial setting time 39 minutes and final setting time 432 minutes is used to prepare concrete. Other physical and chemical properties of cement like specific gravity, soundness, lime, alumina, magnesia content etc. are as reported by supplier.

2) Water

Water used for mixing of cement as well as for curing is required to be have limited concentration of organic particles, inorganic particles and chemicals like sulphates, chloride etc. In this regard potable water supplied by Municipal Corporation or fresh water from lakes and river is found satisfactory.

3) Fine aggregate

The sand used as fine aggregate is obtained from local supplier. The sieve analysis of sand is performed and sand is found to conform to Zone-II of IS code (IS 383). The sand is checked to be free from organic materials etc.

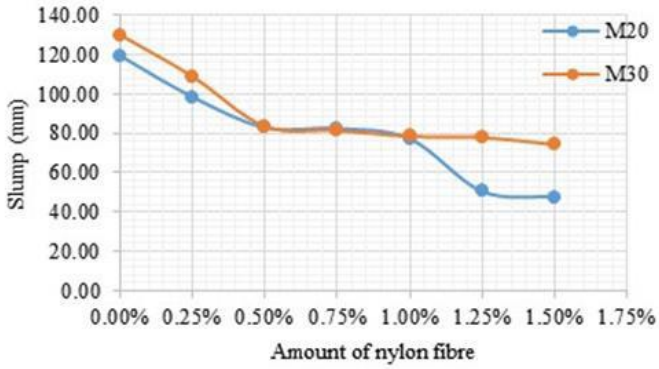
IV. RESULTS AND DISCUSSIONS

While preparing concrete it is observed that when nylon fibres are mixed along with water in cement concrete, they tend to cause number of small number of lumps and fibres hence are not distributed evenly. These lumps are required to be broken and mixed thoroughly to give uniform consistency of fibres in cement concrete.

The results obtained through experimental tests on various mixes given in Table 1 are given in this section. The fibre of any kind are known to improve tensile strength hence, split tensile strength is also given.

A. ***Workability****:*

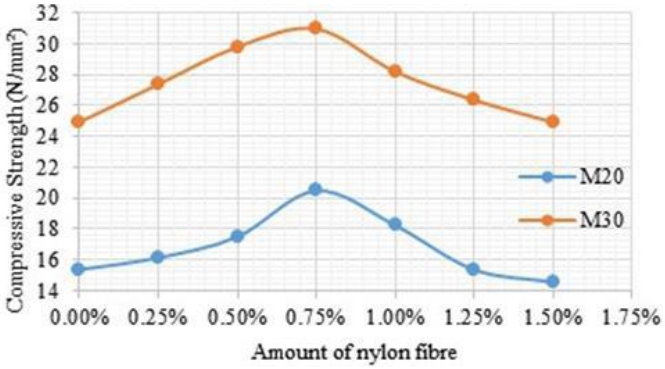
The results obtained from slump test of various mixes are shown in Table 2. The concrete with high fibre content of 1% to 1.5% was found to cause segregation and lump formation in concrete leading to harsh concrete.

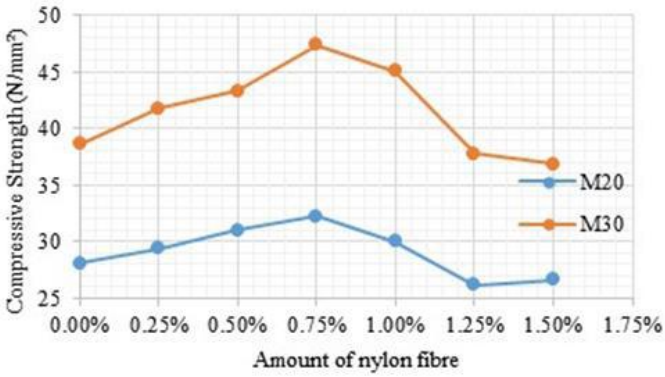


B. ***Compressive Strength:***

The compressive strength results for mixes are shown in Table 3. The compressive strength test results for M20 and M30 concrete at 7-days and 28-days are plotted in Fig. 3 and Fig. 4 respectively.

It can be seen that there is marked increase in compressive strength in both M20 and M30 concrete as nylon fibre concentration is increased. This increase is only for amount of fibre near 1% beyond which the strength starts to decrease. This decrease in strength is chiefly due to lower workability of concrete leading to segregation and uneven mixing



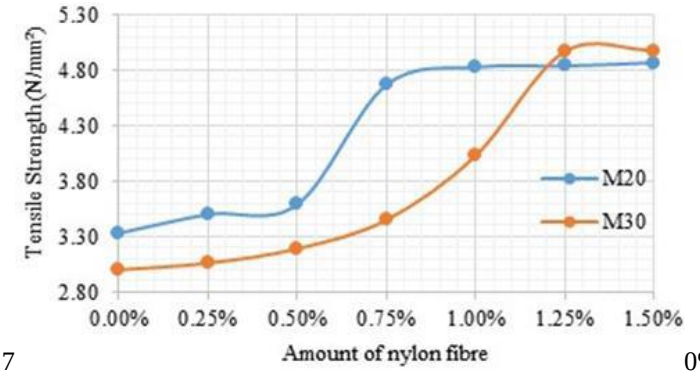


The slump test variation for mixes is also plotted in Fig. 2. As can be observed, the slump value becomes about 55-65% at higher amount of nylon fibres.

C. ***Tensile Strength****:*

One of the benefits of using fibres (of any type) is that they impart enhancement in tensile strength. The improvement in tensile strength of concrete when mixed with nylon fiber is evaluated by performing split tensile strength test on concrete mixes. The results are tabulated in Table 4.

The variation in tensile strength of different concrete mixes with varying amount of nylon fibre is shown in Fig. 4 and Fig. 5. From these results it is observed that with use of nylon fibre in concrete the tensile strength is found to increase by 50% .



7 0%.

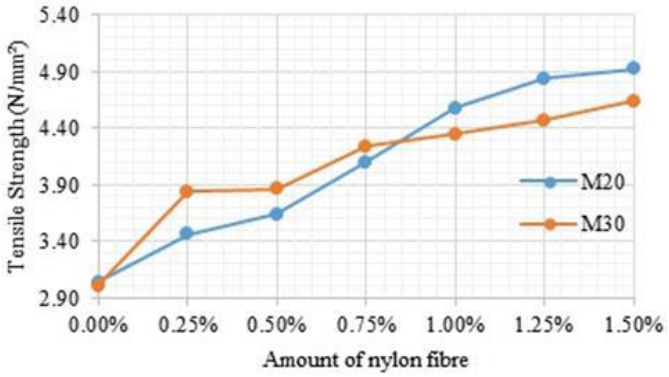


Table -1: Sample Table format

Designation	Compressive strength, N/mm² (7-days)	Compressive strength, N/mm²(28-days)
N10	15.35	28.08
N11	16.12	29.40
N12	17.48	31.05
N13	20.46	32.26
N14	18.23	30.05
N15	15.35	26.17
N16	14.54	26.65
N20	24.92	38.64
N21	27.37	41.77
N22	29.79	43.33
N23	30.96	47.38
N24	28.19	45.08
N25	26.35	37.75

A. Tensile Strength:

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Designation	Tensile strength,N/mm² (7-days)	Tensile strength,N/mm² (28-days)
N10	3.33	3.04
N11	3.50	3.46
N12	3.59	3.64
N13	4.67	4.10
N14	4.83	4.58
N15	4.84	4.84
N16	4.87	4.92
N20	3.00	3.01
N21	3.06	3.84
N22	3.19	3.86
N23	3.45	4.24
N24	4.03	4.35
N25	4.97	4.47

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III. CONCLUSIONS

1. Environmental Aspect: -
a)In developing countries like India problem of Disposal of used fishnet is going to be Complicated. It is dangerous to environment and man also.

b) It avoids pollution compared to the asbestos cement sheet.

c) Disposal of used fishnet in landfill may cause problems of mosquito breeding. This problem will be solved.

2. Strength: -
The fishnet reinforced sheet gives good flexure strength. Flexure strength of AC sheet is 5250 N/mm width and after testing, we get the flexure strength of fishnet reinforced sheet is 3500 N/mm width.

3. Economical
a)As compare to A/C sheet the cost of nylon
reinforced sheet is very less The nylon fibres, which are used in range of products require proper disposal so as not to affect environment significantly. The fibres are known for its strength, durability and resilience. When used in concrete, these properties significantly improve the quality of concrete while solving the problem of their disposal. In present study, nylon fibres are mixed in concrete in varying quantities and its effect on property of concrete is evaluated. The slump shows that there is reduction in workability of concrete with nylon fibre which is similar to other type of fibre. However, at about 1% to 1.5% amount of fibre, the slump value is found to reduce significantly and concrete was observed very harsh. The effect of reduced workability is seen in compressive strength test. The compressive strength was found to increase with increase in nylon fibre. However at about 1% amount of fibre, the compressive strength dropped significantly which is chiefly due to lower workability.
The tensile strength of concrete with nylon fibre was found to increase by 60-70% at high amount of nylon fibre which makes it useful in places where it is expected that slight tensile stresses may overcome like temperature stresses, creep etc.

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