Effect Of Addition of Recron 3s Fiber And Glass Fiber On The Strength Characteristics Of M-30 Concrete

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Abstract: The concrete is strong in compression, as the aggregate loads the pressure load efficiently. However, the tension is weak as the cement that keeps the aggregates in place can be broken, allowing the structure to fail. This weakness has been fixed for many decades using a system of reinforcement bars to create reinforced concrete. The concrete is primarily resistant to pressure pressures and reinforcement bars. Concrete is a mixture of cement, coarse aggregate, fine aggregates, sand and water. Concrete is one of the most versatile materials. The class can be adapted to any type of structures. The advantages of concrete are good compressive strength, good fire resistance and high water resistance. But concrete is the week in tensile strength. To overcome these defects, we use good reinforcement in tensile strength. Fiber is used to overcome these advantages. Fiber is good at bending resistance, tensile strength and impact resistance. This research explores the fiber-3S blend in cement reinforcement and fiberglass blend in concrete reinforcement. The solution finds that the fiberglass mixture is cost-effective, while glass resistance takes time compared to 3S fibers. Glass fiber plays a vital role in producing additional strength in concrete. From this experimental work, we concluded that the maximum percentage of glass fiber that can be used in concrete as an arming material is 1.5% for positive results. The problem we face during this research work is mixing glass fibers in concrete. Then to find this problem, the manual method is used to distribute glass fibers in concrete. However, the maximum compressive strength of reinforced concrete reinforced with polypropylene fibers is also increases by 25% compared to normal self-pumping concrete. In addition, the maximum pressure strength was reached when the fiber ratio was 0.2. This describes the experimental result with the replacement of cement and different fiber content, as determined by different fiber glass content.

Keywords- concrete, coarse aggregate, 3S fibers, Glass fiber, tensile strength.

1. Introduction

Concrete is the most widely used human building material in the world. Just a ton of concrete is produced every year for everyone in the world that is basic, concrete is strong and durable. While concrete technology across the industry continues to rise in demand for a changing market place. The construction industry recognizes that significant development is essential to productivity, productivity, energy efficiency and environmental performance. The industry will need to address and overcome the many challenges of competitive and technological institutions. One of the biggest challenges with environmental awareness and the lack of landfill is the use of waste as an alternative to waste. In all industrial sectors, including the concrete industry, the cost of environmental compliance is high. The use of external industrial products such as colored sand, fly ash, bottom ash and slag may result in significant improvements in the overall energy efficiency of the industry and environmental performance. [1-3]

The use of all this kind of integration has increased significantly in recent years in many countries at a rate far exceeded by the rate of growth of their economy or of their construction industry. Illegal synthetic aggregates are expensive to produce, and the available source of organic compounds can be very far from the point of use, in which case, transportation costs are a problem. Other factors to consider are the continuous and increasing removal of natural clusters associated with major environmental problems. Usually it leads to unexplained deterioration of the side of the country. Seating occasionally leads to a disturbed area etc.

In general the concrete is good for compression but weak for compression. Stabilization of the natural fiber structure can be one solution, which requires the right amount of fiber in the concrete. A certain amount of fiber can be useful for the development of indirect concrete structures it is not necessary that all structures will be enhanced by the addition of fiber can add some properties and at the same time reduce others as well. Medium power range M25-M55. Before this the optimal fiber mass should be selected (i.e.) 2% fiber content and 4% and 6% and 8% cement weight and 6.0cm length is used to prepare CFRC samples. Natural fibers and recron fibers can be one possible option, as they are cheap and available somewhere in many countries. Although these fibers have a natural advantage, they have certain limitations such as low durability and low strength. The paper reports on the behavior of the recron fiber. Such materials will increase service life and reduce the cost of living of the building.[4-6]

1.1 Types of Fiber

Fibers can be divided into two categories: Synthetic fiber and natural fiber. Some of the most commonly used fibers are coconut fiber, Sisal fiber, jute, fiber, Cotton fiber, Asbestos fiber, and metallic fiber and Glass fiber.

Synthetic Fibers

Different types of synthetic fiber are polypropylene, nylon, plastic, asbestos glass etc. This selection has a natural cord due to its high strength and resistance. Polypropylene fiber is resistant to acidic, alkali and chemicals (Setty and Rao, 1987). These fibers are strong, resistant to seawater and high melting point i.e. 1650C. Polyimide has a natural feature of being affected by ultraviolet radiation from the sun but as the fiber is absorbed it is not affected. For fiber experience, no chemical changes were found. Synthetic fibers also exhibit high environmental resistance. Polypropylene fibers are prone to fire and sunlight that cannot reach the soil.

Natural Fibers

The various types of natural fiber found in India are: coir, sisal, jute, bhabar, hemp, munja, bamboo and banana. To reduce the cost of ply soil, locally available fibers should be considered in construction. But at the same time the durability and health of the building must be given the utmost importance. Most of these fibers are tested and found to be weakened when replaced with a “wet and dry” surface.

Direction of Placement

Fibers can be moved or mixed randomly into the soil. In the restricted section, the inserts are placed inside the soil at certain points and points where it is in a random phase, compressed, mixed with the soil and placed between the possible shear zones. The concept of randomly stabilized soils is relatively new compared to the geotechnical field. The French public works ministry uses Texsol as RDFS. In the field putting pieces in a certain shape is a daunting task. In compressed soils, the additional material (Geo-made sheet, etc.) is structured in some way with the shape, which can keep the soil weak in another way. While in ply soils, isotropy in energy is maintained. [7-8]

1.2 Recron 3S fiber

Recron 3S fiber Recron3S is a modified fiber polyester. It is often used as a second reinforcement material in concrete and soil to enhance their performance. The 3R3S sample used in the experiment was 12mm long and was manufactured by Reliance Industries Limited. The physical parameters of the Recron 3S fiber as found on the RIL Security sheet are given in table 1. [6-9]

Table 1. Physical parameters of Recron 3S Fiber (Ril Safety Data Sheet) [13].

Serial. No.	Parameter	Value
1	Appearance	Short cut staple fibre
2	Diameter	35 – 40 micron
3	Viscosity	Not applicable
4	Ignition temperature	> 450 °C
5	Melting point	162-167 °C
6	Flash point	> 329 °C
7	Relative density	0.89-0.94 g/cm³
8	Color	White

1.3 Role of RECRON-3s

• Controls Cracking:

RECRON 3s prevents the shrinkage cracks developed during curing making the structure/plaster/component inherently stronger. Further when the loads imposed on concrete approach that for failure, cracks will propagate, sometimes rapidly. Addition of RECRON 3s in concrete and plaster prevents/arrests cracking caused by volume change (expansion & contraction).

• Reduces water permeability:

A cement structure free from such micro cracks prevents water or moisture from entering and migrating throughout the concrete. This in turn helps prevent the corrosion of steel used for primary reinforcement in the structure. This in turn improves longevity of the structure.

• Reduces Rebound In Concrete - Brings Direct Saving &Gain:

RECRON 3s fibers reduce rebound "splattering" of concrete and shotcrete. The raw material wastage reduces & results in direct saving in terms of raw material. More importantly it saves a great deal of labour employed for the job, which could be completed earlier.

• Increases Flexibility:

The modulus of elasticity of RECRON 3s is high with respect to the modulus of elasticity of the concrete or mortar binder. The RECRON 3s fibers help increase flexural strength.

• Safe and Easy To Use:

RECRON 3s fibers are environmental friendly and nonhazardous. They easily disperse and separate in the mix. [9-11]

1.4 Glass Fibers

Glass fiber (or fiber fiber) is a material that contains many fine glass fibers. Glassmakers throughout history have experimented with glass fibers, but the mass production of glass tiles was made possible only by the introduction of a skilled mechanical implant. In 1893, Edward Drummond Libbey produced a blanket at the World's Columbian Exposition that incorporates a wide range of glass fibers and silk embroidery. Glass pieces can also come naturally, like Pele's hair.

Glass wool, the only product called "fiberglass" today, was developed in 1932 to 1933 by the Russell Games Slayter of Owens-Corning, as a material that will be used as an air conditioner. It is sold under the trademark Fiberglas, which has become a standard trademark. Glass fiber when used as a thermal insulation material, is specially formulated by a binding agent to immobilize many small air cells, resulting in a product family that is filled with less air filled "glass holders". [12]

2. Material And Methodology

Ordinary Portland cement of 43 grade is used confirming to IS: 8112-1989. Crushed granite metal (graded) with 20 mm to a proportion of 60% and 10 mm to a proportion of 40% is used as coarse aggregate which is tested according to IS: 2386-1963. River sand according to IS: 383-1970confirming to zone – II is used as fine aggregate. Recron 3s Fiber is used. It was launched by Reliance Technology Centre for asbestos Cement Industry. Fosrocconplast SP 430 is used as admixture. [12-14]

2.1 **Mix Design**

The concrete mix project is a process of selecting the suitable ingredients of concrete and determining their maximum proportion which would produce, as economically as possible, concrete that satisfies a certain compressive strength and desired workability. The mix design is done according to IS 10262 (2009). In order that not more than the specified proportion of test results are likely to fall below the characteristic strength, the concrete mix has to be proportioned for higher target mean compressive strength J..,. The margin over characteristic strength is given by following relation:

$Fm = fck + 1.65\ \sigma$

Where Fm = target strength

fck = characteristic strength of concrete

σ = standard deviation

The mix proportions adopted for M30 grade concrete the adopted mix proportion is 1:0.75:1.5 with water/cement ratio of 0.45 and cement content of 380 kg/m³. A total of 4 mixes for each grade is adopted i.e. for M30 grade of concrete 0.1 %, 0.2%, 0.3% and 0.4% adding of modified Recron 3s fiber.

Tests to be done are as follows

1) Compressive strength Test
2) Split Tensile Strength Test
3) Flexural Strength Test [9-15]

3. Experimental Result

The findings of the study reported a behavioral relationship between the strength that separates basic strengths and the oppressive forces of lesbians. This work studied the experimental and analytical relationships that exist between the separation of small energies and compressive forces. The following three tests should be performed on the concrete M-30 using first as the Regron 3s with it and then Glass fiber and then looking at Complex, Split tensile strength and Flexure Strength and compare the following.

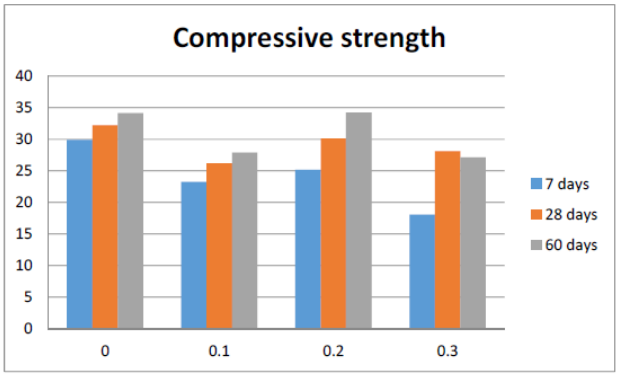

Figure 1. Compressive Strength

The above graph and table shows the recron 3s fiber% 7 days compressive strength (N/mm2), 28 days compressive strength (N/mm2), 60 days compressive strength (N/mm2). In 0.and 0.1 compressive strength % decreases and in 0.2 strength is increase and again is decreases in recron 3s fiber percentage 0.3 %.

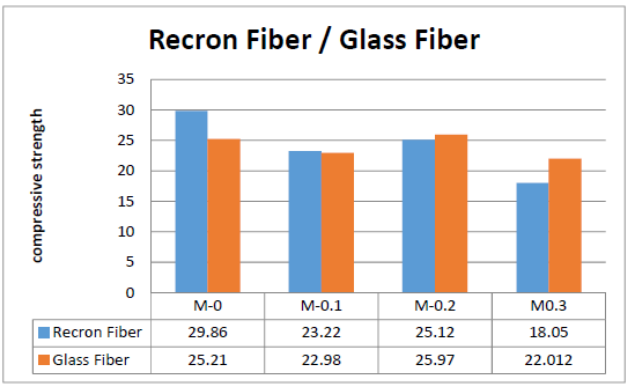

Figure 2. Comparative analysis of Recron Fibervs Glass Fiber for 7 days

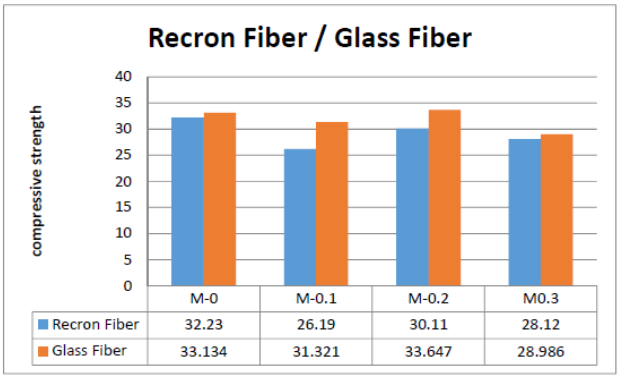

Figure 3. Figure Recron Fiber vs Glass Fiber for 28 days

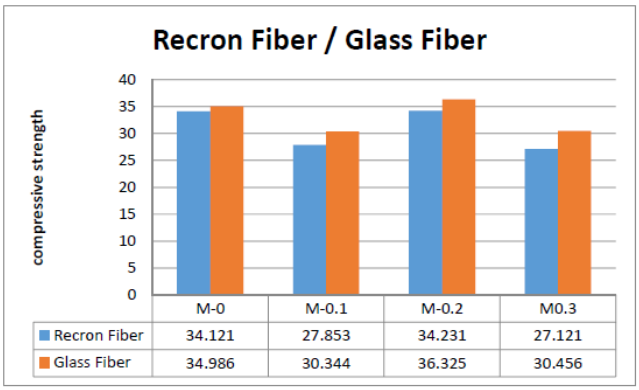

Figure 4. Recron Fiber vs Glass Fiber for 60 days

4. Conclusion And Future Scope

Advantage of concrete is good in compressive strength but tensile strength of concrete is weak and to overcome these advantage we use reinforcement. We can also use fiber to overcome these benefits fiber is great for variable strength, strong strength and strong impact Study and experiment have been performed with various amount of % of glass fiber and recron 3S fiber which gives following conclusions:

- This paper explores the mixing of fiber-3S with concrete strength and the mixing of glass fibers with concrete strength. The solution found is that mixing glass is expensive while in glass energy takes time compared to 3S-Fiber.
- Compressive strength of glass fiber is more as compare to recron 3S fiber in 28 days.
- Split tensile strength of recron 3S fiber is more as compare to glass fiber in 28 days.
- Flexural strength of glass fiber is more than recron 3S fiber in 28 days.

The use of medium and high glass layers greatly improves post-peak thermal performance to suit flexibility, by stretching the softening branch and reducing the rough slope. The data obtained emphasize that, with a precise mixing design, a consistent quality of fiber reinforced concrete and a high volume component can be created. An increase in fiber content improves post-peak performance and maintains the softening branch. This paper shows that the Result of GCBS with the replacement of cement and various fiber recron 3s that also explain the contents of different glass. This article demonstrates and describes the Competitive Stability of Fiber.

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