Experimental Analysis of Fiber Concrete with Waste Material

Jitendra Badwaya[1], Dharmendra Kurmi[2]
[1]*Mtech scholar, Vikrant institute of technology and management Indore*
[2]*Assistant Professor, Vikrant institute of technology and management Indore*

***Abstract*- The strength of concrete is determined by using Flexural test and strength test of M40 concrete. Compressive strength, Flexural strength, Split tensile strength and Alkalinity test of concrete mixes made with and without steel fibre, sand and 6mm down basalt have determined at 7 & 28 days. The compressive and flexural strength have determined of 0.50%, 1%, 1.5%, 2%, 2.5% and 3%, steel fibre added M40 concrete. Results shows that the increase SF compressive strength of the cement is high as compare to M40 cement concrete. The compressive &flexural strength also determine for M40 with mix sand marble stone dust and kota stone dust,0.50%, 1%, 1.5% ,2%, 2.5% and 3%, steel fiber and 5% ,10%, 15%,20%,25% 30% mix sand of MSD, KSD.**

Compressive strength, split tensile strength and flexural strength test were performed and results were analyzed to associate with above fiber combinations. Based on experimental studies, the paper identifies fiber combinations that demonstrate maximum compressive, split tensile and flexural strength of concrete. Relationship between compressive strength and split tensile strength, compressive strength and flexural strength is presented.

M-40 concrete has determined compressive strength for the 7 & 28 days material. The three material cubes have taken for compressive strength test, every cube of 28 days strength is higher than the 7 days material strength.

The percentage of SF mix is increases in the concrete M40 so increases compressive strength of the concrete materials.

M-40 concrete with mix sand of MSD, KSD5% ,10%, 15%,20%,25% 30% by wt of sand and SF compressive strength for the 7 & 28 days material. The three material cubes have taken for compressive strength test, every cube of 28 days strength is higher than the 7 days material strength. The percentage of SF mix is increases in the concrete M40 so increases compressive strength of the concrete materials.

The three material (M-40 concrete with mix steel fibre and sand) beams have taken for strength test, every beam of 28 days strength is higher than the 7 days material strength. The percentage of SF mix is increases in the concrete M40 so increases strength of the concrete materials.

***Index terms*- Compressive strength, steel fibre, split tensile, steel fibre**

1.INTRODUCTION

The consumption of aggregate of all types has been increasing in recent years. In most countries at a rate far exceeding that suggested by the growth of their economy of construction industry. The non-decaying waste materials cause a waste disposal crisis, thereby contributing to the environmental problems. Most of these materials are left as stockpiles, landfill material or illegally dumped in selected areas. Since waste plastic is a non decomposable material and dumping of waste plastic disturbs the environment and ecology. Hence lot of innovations in recycling of waste plastics has been practiced in many countries in order to avoid environment pollution.

Although there are many studies that have been reported by investigators on the use of waste plastic in cement concrete, not much research has been carried out in India concerning the comparative analysis of low density and high density plastic in fibre reinforced concrete. Therefore this paper presents the study of the comparison of low density and high density plastic as a partial replacement of fine aggregate in fibre reinforced concrete. Materials Cement The cement used in this work was an ordinary Portland cement (OPC) of grade 43 with a specific gravity of 3.12. Fine aggregate In the present investigation, river sand taken from Vaigai river, which was available at Madurai, was used as fine aggregate. The specific gravity of fine aggregate was 2.57. Coarse aggregate coarse aggregates used in this study were crushed blue granite stone aggregate of

size 20mm. The specific gravity of coarse aggregate was 2.7. Polyethylene There is a number of different variants of polyethylene. Low and high density polyethylene (LDPE and HDPE respectively) are the two most common and the material properties vary across the different variants.

Fig. No. 1.1 Different Fiber in Concrete Cube after Tested

It was described High Performance Fiber Reinforced Concretes (HPFRC) are promising materials with better involuntary properties accounting for split amount and dissemination under excessive tensile loads along with the many commonly encountered durability issues. Three different fibers were used at a maximum of 2% of volume in single or hybrid systems: polyvinyl-alcohol (P), hooked-end steel (S) and nylon (N) fibers. To function synergistically with different fiber types and high amounts of coarse aggregates, matrix properties were optimized by varying the proportions of fly ash to Portland cement (FA/PC ratios of 0.20, 0.45, and 0.70, by weight) and aggregate to binder (A/B ratios of 1.0, 1.5, and 2.0, by weight).

Some other researcher also presented workability of an existing Hybrid Fiber-Reinforced Concrete (HyFRC) merged is improved though the integration of concepts from the field of Self-Consolidating Concrete (SCC). The resulting composite, achieved through a described parametric study, allows for easier placement within areas of high reinforcement congestion while maintaining the desired mechanical performance benefits inherent to high performance hybrid fiber-reinforced concrete composites. Retention of the strengthening and ductility enhancement, characteristic of the original HyFRC, is gauged by material response to direct tension and four point bending tests.

1.1 Scope and objective

1.1.1 Scope To increase the strength of concrete.

1.1.2 Objective To conduct laboratory test to check the properties of cement, sand and aggregates. To conduct laboratory test to check the strength of fiber reinforced concrete. To compare the strength of the normal concrete to the reinforced concrete fiber

1.1.3 Need for study Today the construction industry is in require of finding cost effective materials for increase the strength of concrete structure. Hence an attempt has been made in the present investigations to study the influence of adding of waste materials like lathe waste, soft drink bottle caps, empty waste tins, waste steel powder so as to increase the strength of concrete, Since the concrete is inherit weak in tension. it comparatively possess little resistance and ductility to cracking .these cracks propagate on applications of loads, Which leads to brittle fracture of concrete.

The following techniques are adopted to improve the strength of concrete.

- Introduction of steel reinforcement.
- Introduction of several layers of wire mesh.
- Addition of chemicals and resins.
- Introduction of pre-compression by the pre stressing techniques.
- The addition of both long and short fiber.

2.METHODOLOGY

It was investigated for a M40 grade concrete at a volume fraction of 0.5%. Control and three hybrid fiber composites were cast using different fiber proportions of steel and polypropylene. Compressive strength, split tensile strength and flexural strength test were performed and results were analyzed to associate with above fiber combinations. The results were identified fiber combinations that demonstrate maximum compressive, split tensile and flexural strength of concrete. Relationship between compressive strength and split tensile strength, compressive strength and flexural strength is presented.

Steel fibers can improve the structural strength to reduce in the heavy steel reinforcement requirement. Freeze thaw resistance of the concrete is improved. Durability of the concrete is improved to reduce in

the crack widths. Polypropylene and Nylon fibers are used to improve the impact resistance

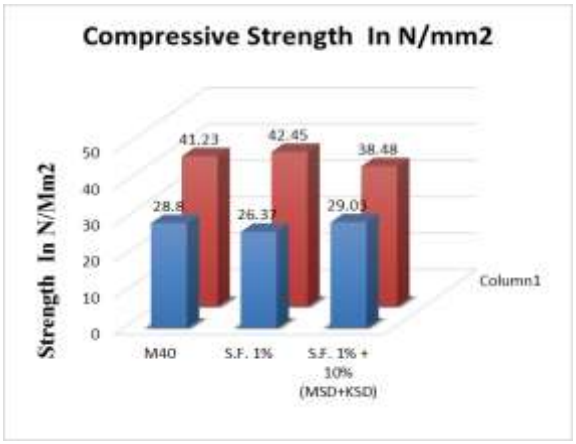
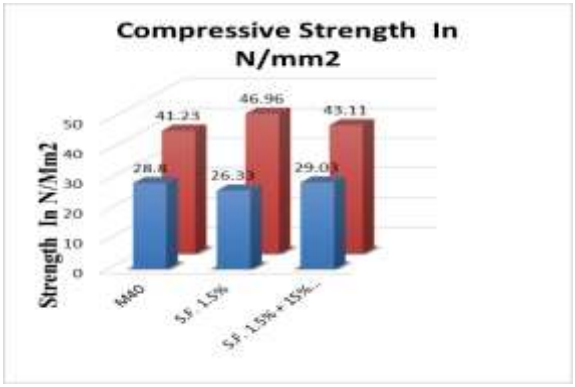


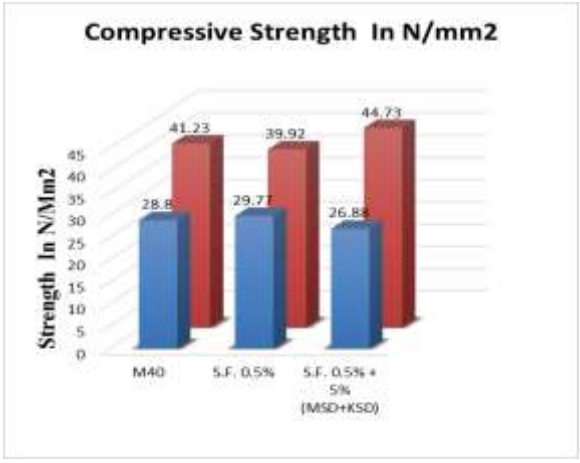
Figure 2.1 Concrete mixes for M-40 (Slump Cone Test of concrete

Case 1- In This Graph We Compression between the Different Percentage Conditions with Standard M40 Grad of Concrete As Shown In Fig

Fig.no. 3.1: According mix design to test on 7 days and 28 days average strength of cube on 0.5% S.F. and 5% (MSD+KSD)

3. RESULT DISCUSSION





Case 2 - In This Graph We Compression between the Different Percentage Conditions with Standard M40 Grad of Concrete As Shown In Fig. on 1% S.F, 10%(MSD+KSD

Fig.no. 3.2: According mix design to test on 7 days and 28 days average strength of cube on 1% S.F. and 10% (MSD+KSD)

It was observed that the concrete with 10% of LDPP exhibits the maximum flexural strength. From 0% of replacement to 10% of replacement, the flexural strength was gradually increasing while from 10% to 15% it was gradually decreasing.

GraphWe Compression between the Different Percentage Conditions with Standard M40 Grad of Concrete As Shown

In Fig. on 1.5% S.F, 15%(MSD+KSD)

- The mixes of the steel fibre percentage have increases with cement resulting in higher compressive strength in the concrete mix. And gives different result but in (1% or 1.5 %) in case of without mix msd+ksd

- The results clear indicate the compressive strength of the 28 days material is higher as compare to 7 days material. We can say that age of concert.
- Figure shows that the M40 with mix msd+ksdconcrete with 0.50%, 1%, 1.5%, 2%, 2.5%, and 3% steel fibre compressive strength for the 7 & 28 days. The results clear indicate the strength of the Sample-3, 1.5% SF is higher than other percentage mix SF. But as compare to beam not follow.
- Figure shows that the M40 with mix marble stone dust, kota stone dust concrete with 5%, 10%, 15% 20%, 25% and 30% sand replacement compressive strength for the 7 & 28 days. The results clear indicate the strength of the material is decrease with increase in sand percentage in concrete.
- In conclusion number-4 we clear indicated the various percentage of mix in concrete both steel fiber and marble stone dust and kota stone dust gives best result on 2% S.F. and 20% MSD+KSD.
- When we increase the percentage on case of steel fiber and MSD+KSD 2.5% S.F. 20% MSD+KSD strength will be decreases.
- Due to adding of steel fiber and marble, kota stone dust in concrete where found that cube temperature decreases as compare normal concrete.
- Figure shows that the M40 material beams tested in flexural test for the 7

Fig.no.3.3 : According mix design to test on 7 days and 28 days average strength of cube on 1.5% S.F. and 15% (MSD+KSD)

& 28 days material. The results clear indicate the strength of the 28 days material is higher as compare to 7 days material.

- The flexural strength results clear indicate the strength of the beam0.50% and 1 % SF is higher than the 2%, 2.5% & 3% mix SF. To required more compaction required good workmanship without marble stone dust and kota stone dust.
- The flexural strength results clear indicate the strength of the beam0.50% and 1 % SF is higher than the 2%, 2.5% & 3% mix SF. but when we added the 1.5% S.F. and 15% (MSD+KSD) in concrete also gives beast result .To required more compaction required good workmanship.

4. CONCLUSION

The compressive strength of concrete increases up to 10% as the percentage of plastic is increased in concrete as a replacement of fine aggregate. 2. A concrete mixture made of 15% plastic waste had lowest compressive strength at 28 days curing age that was below the value of the conventional concrete mixture. 3. Best compressive strength, split tensile strength and flexural strength is obtained at 10% fine aggregate replacement with plastic waste and using polypropylene fiber reinforcement. 4. As the strength of 10% replaced concrete is very close to the conventional cube strength hence it can be concluded that it is safe to use plastic as partial replacement of fine aggregate (10%) with 2% of polypropylene fibres in concrete.

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