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A Research on Study the Behaviour of Concrete using Waste Tires Chips

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ABSTRACT

Concrete is one in all the principal wide utilized development materials in the world. Regular assets rises a developing worry for shielding the environmental factors and a need to save common assets, by different material which territory unit reused or waste materials during this examination, an investigation was applied on the work of reused elastic tires as a fractional substitution for coarse Aggregates in Concrete development utilizing provincially reachable waste tires. In the principal a piece of this proposal, the foundation of the investigation The examination was applied by leading tests on the Waste materials to see their properties and reasonableness for the analysis. Concrete Was prepared comprising of 3 Concrete evaluations (M20 and M25). The examples were made with extent substitutions of the coarse blend by ten, twenty five and fifty endeavor elastic blend. Besides, an orientation join with no substitution of the coarse blend was made to make a similar examination. The arrangements of tests led are; droop, unit weight, compressive quality, lastingness, sway obstruction and flexural quality tests. the data collection was predominantly upheld the tests led on the prepared examples inside the research center. The check results were contrasted and the few run of the mill Concrete properties and show that there's a rebate in compressive quality of the Concrete as a result of the consideration of elastic Aggregates. yet this could constrain its utilization in some auxiliary applications, it has hardly any alluring attributes like lower thickness, higher effect opposition, expanded versatility, and a little increment in flexural quality inside the lower compressive quality Concrete classifications. the outcomes demonstrate that it's capability to utilize reused elastic tires in Concrete development as a halfway swap for coarse Aggregates. no different, the extent of substitution should be confined to a minor amount and furthermore the application should be limited to express cases any place the improved properties due to the elastic Aggregates zone unit entrancing.

KEYWORDS: *Sugarcane Bagasse Ash, Workability, Compressive Strength, Compaction Factor, Slump Test*

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INTRODUCTION

Concrete is the most commonly used construction medium in the world. For most infrastructures, including manufacturing, retail , residential and military buildings , dams, power plants and transportation networks, concrete quality and reliability plays a critical position. Concrete is the biggest single manufacturing product in the world and accounts for over 6 billion metric tons of materials each year. However, so far, concrete building has concentrated largely on the usage of virgin natural capital. In the meantime it is worth remembering the natural resource management concepts and it is also necessary to look at the numerous alternatives. The process for recycling lies in between. That is a twofold gain. One is to prevent the degradation of precious natural resources and the other is to safeguard numerous consumer items from their serious risks to the ecosystem. It has been well known that about 1 billion used car tires are made worldwide per year. In addition to that, traditional methods of recycling tyres like a shoe making material and other devices are now decreasing in our region. It is considered one of the main environmental problems affecting societies all over the planet, as waste rubber is not readily biodegradable even after long stretches of landfill service. Recycling is the best way of handling used tyres worn out in anticipation of reuse. The usage of scrap tyres can minimize effects on the atmosphere and enhance the protection of natural capital. One possible response to this dilemma is the incorporation of rubber particles into cement-dependent goods. Hundreds of crumb rubber products may be crushed to recycle tires for use in raw materials.

The other aspect of the issue is that aggregate production is increasingly contributing to the depletion of natural resources for building purposes. In addition, some countries rely on imported aggregates and that is obviously very costly. The Netherlands, for example, does not have its own measure, so will import it. This concern leads to increased interest in using sustainable materials which can replace natural aggregates.

LITERATURE REVIEW

Dr. D.L VenkateshBabu,. To improve its tensioning properties, steel fibers were inserted into the concrete. The polymer concrete models were casted and tested with and without fibers to investigate the production of such mechanical and physical properties such as compressive forces, tensile strengths and workability. We used silicone Styrene Butadiene Rubber Latex and hooked end steel fibres in our work. They are latex 5 per cent SBR and steel fibers 0.5 per cent. The goods in reinforced concrete were tested in days 7 and 28. It was observed that the prescribed dose of fibers increased the early compressive strength of concrete but diminished the compressive force by 28 days. Steel fibers are used to increase the tensile strength of concrete Cement OPC Birla Super 53 style cement for our laboratory work. Both cement assets as per code IS 12269: 1987 is tested for 53 grade ordinary Portland cement. Generic density of cement is 3.15. The first and final settling time for cement was determined to be 70 minutes, and 220 minutes respectively. The fineness and consistency of cement is known to be 1.5% to 30%.

Z. A. Siddhiqi et.al. The effects of His study notes the results of applying polymer SBR latex to concrete both in terms of compressive strength and water absorption. SBR latex is also found to improve the internal structure of modified latex concrete resulting in a significant 28-day reduction of the water absorption volume. A contrast has been found of modified concrete from SBR in controlled concrete. From the findings it is inferred that on 28 days an increase in compressive strength and decrease in water absorption was found, while on the 7th day the early compressive intensity had negative effects, and early water absorption was low. Specimens range from 5% to 10%, with polymer dosages up to 20%.

V. M. Sautaraja et al present a analysis to examine the properties of concrete which can be further improved by incorporating SBR polymer along with steel fiber. This paper notes that improvement in strength due to the combined application of steel fiber and polymer SBR latex in standard concrete results in improved strength , resilience, hardness, cracking tolerance and propagation of cracks. The effect of curing condition on th intensity obtaining composite properties has also been observed. The P / C ratio preserving steady steel fiber differed with 0.75 per cent rise and 1.5 per cent bet wt raise. In cement: a massive increase in compressive strength and ductility following splitting is introduced into concrete. Test effects were found with respect to flexure and compressive forces, the increase in flexural and compressive strength was more efficient in dry curing, while the strength decreased with wet curing. Therefore it is expected to be inferred that the power of concrete is harmful to wet curing. Decreased workability is balanced in polymeric materials under dry curing environment due to the introduction of steel fibres.

R. Radhakrishnan clarified the application of polymer to repair existing concrete structures to repair existing concrete structures. For restore systems for increase service life, the amount of available approaches and resources, but the degree of effectiveness of any concrete repair relies largely on the appropriate choice and method of repair material use. Repair techniques are largely based on water penetration resistance and structural tensile cracking. To research the impact of cementitious content on SBR latex. A blend ratio of mortar1:3 was rendered with additional SBR by weight of cement at 20 per cent. In terms of compressive strength and break tensile strength for patched cylinder a comparative analysis was performed between added SBR specimen and control specimen without SBR. Along with the effect of thermal cycling on patched concrete, sorptivity experiments were also taken. It is understood from the study result that SBR modified cement mortar has very high water penetration and that SBR as a bonding agent has strong tensile strength relative to cement slurry. A SBR as a additive and as a cement mortar bonding agent meets the criteria provided by the ASTM specification. Upon thermal cycling, SBR multiplier retains improved efficiency and thus proved to be a

Sivakumar. M. V. N notes that various polymers have a comparative impact on concrete structural properties. A mechanical and flexural properties of transformed concrete made from polymer were found in this research. Two separate forms of latex-styrene butadiene polymers and acrylic styrene were used with various dosages (0-20 percent) to independently alter concrete composites in each situation. A statistical analysis of the results for the 7th as well as the 28th day was performed. Wet curing method was carried out up to the test date for a validity of this experiment. It was also found that polymer dosages are suitable for 15 per cent polymer in both situations. Although supporting the efficacy of each polymer, it was understood that due to its small particle size and comparatively less viscosity, acrylic styrene was proved superior to latex polymer.

R. Wang The dose of polymer ranged from 0-25 percent. The effects of wet and dry cure were generally detected at different healing ages. Findings were compared with guided polymer less mortar. The substantial improvement in flexural, split tensile and compressive strength with the air-curing study was observed at a later age compared to water-curing specimens with. Top polymers price was 20 per cent. The greater early intensity and adhesion to old building materials allows rebuilding of the buildings simpler in the shortest practicable period. In concrete buildings the loose concrete is removed, and the resulting voids are filled with materials with strong early resistance. The polymer r modified mortar and concrete may be used for various methods of repair, rehabilitation and stabilization of concrete and masonry buildings depending on the shape and degree of harm caused by the earthquake. Using polymer in cement mortar renders the mortar workable, and improves Sturdy's water cement ratio. At later ages, air cure is preferred to raise the severity of the higher dose.

Abdulkader Ismail A. AL. Hadithi et.al. In this study, the fiber percentage varies by weight of cement up to 1.5% as well as the acrylic polymer content varies as 3%, 7% and 10% by weight of cement. Significant curing of specimens borne by Folic process as minimum water sunk in curing. Test found showed an increase in all control structural properties with the inclusion of steel fibers. Although the introduction of acrylic polymers along with steel fiber has a greater effect than reinforced concrete constructed from steel fiber. There was an improvement in the compressive strength of reinforced concrete made from steel fiber (14.2 percent -29.2 percent), although an improvement in PMSFRC

was observed (44.8- 86.64 percent). Splitting tensile strength was found to increase up to (50-91 percent) for concrete steel fibers, which in the case of PMSFRC tends to increase up to (102.4-124.7 percent). Related increments of flexural intensity were observed as (24.2-48.3 percent) for SFRC and (62-78 percent) for PMSFRC.7 percent of P / C with 1 percent difference of volume fraction was considered to be maximum.

Y. M. Ghugal. Established an experimental study of polymer-modified cement mortars. The factors regarded were the healing age of the substance in polymer and the curing process. This researched the effect of polymer admixture on compressive, tensile breakage, flexural resistance and workability. The dose of polymer ranged from 0-25 percent. The effects of wet and dry cure were generally detected at different healing ages. Findings were compared with guided polymerless mortar. The substantial improvement in flexural, split tensile and compressive strength with the air-curing study was observed at a later age compared to water-curing specimens with. Top polymers price was 20 per cent. The greater early intensity and adhesion to old building materials allows rebuilding of the buildings simpler in the shortest practicable period. In concrete buildings the loose concrete is removed, and the resulting voids are filled with materials with strong early resistance. The polymer r modified mortar and concrete may be used for various methods of repair, rehabilitation and stabilization of concrete and masonry buildings depending on the shape and degree of harm caused by the earthquake. Using polymer in cement mortar renders the mortar workable, and improves Sturdy's water cement ratio. At later ages, air cure is preferred to raise the severity of the higher dose. Thanks to significant changes in technical properties and durability, technologies have been effectively used to rehabilitate the damaged, demolished and subtracted concrete and masonry buildings to be restored and rebuilt in the shortest possible time.

Materials and Methodology

The materials used for the preparation of concrete

- Cement
- Fine aggregate
- Coarse aggregate
- Steel fiber
- Styrene-butadiene rubber (SBR)
- Super plasticizer
- silica fume
- Water

To investigate the properties and suitability 0f the fine aggregate for the intended application, the following tests were carried out.

- Workability
- Slump Test
- VeBe Test
- Compressive strength.
- Density of concrete.
- Flexural Strength

RESULT AND ANALYSIS

Workability Test

This Test is used to find the workability of the concrete by different ways like slump test

Slump Testing Apparatus

Table Slump Test Results

No.	Specimen	Grade	% rubber	Slump (mm)
1	20M1	M20	0	31
2	20M2	M20	10	34
3	20M3	M20	30	42
4	20M4	M20	40	45
5	25M1	M25	0	09
6	25M2	M25	10	19
7	25M3	M25	30	30
8	25M4	M25	40	45

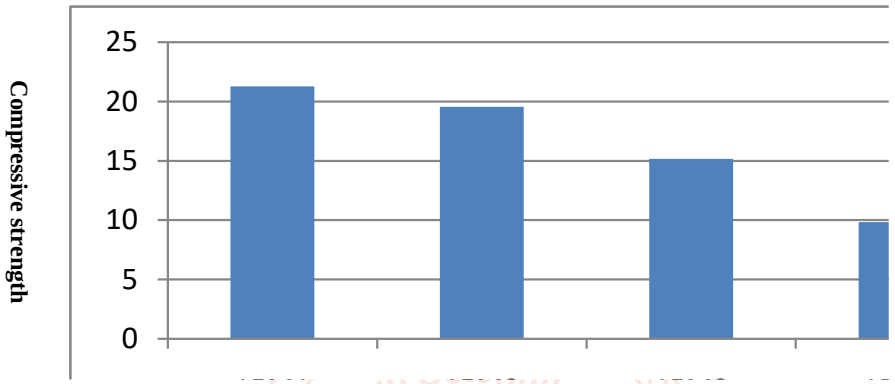
Compressive strength Test

After 28 days of standard curing the compressive strengths of the concrete specimens were determined. The results show that for rubberized concrete, the addition of rubber aggregate resulted in a significant reduction in concrete compressive strength compared to the control concrete. With increasing percentage of rubber aggregate this decrease increased.

Table- Compressive Strength Test Result

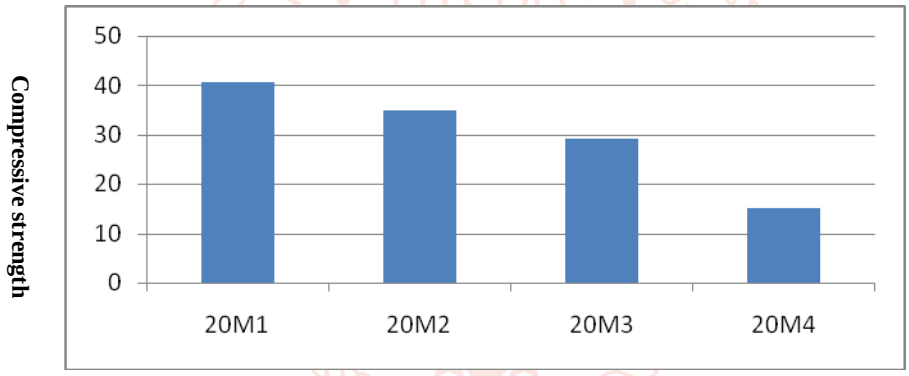
No.	Spec.	Grade	% Rubber	Compressive Strength (N/mm2) 28 Days	% Strength loss 28 Days
1	20M1	M20	0	20.23	0
2	20M2	M20	10	18.54	7
3	20M3	M20	30	14.15	27.65
4	20M4	M20	40	8.81	52.78
5	25M1	M25	0	39.60	0
6	25M2	M25	10	34.21	12.78
7	25M3	M25	30	28.19	27.07
8	25M4	M25	40	14.90	61.80

M20



Specimens (a)

M25



Specimens (b)

Flexural strength Tests

This method provides a particular means of measuring concrete tensile power. The member resisting the motion shall be exposed to internal acts or pressures (shear, tensile and compressive) during mere bending. For a bending force applied downwards on a component assisted literally at its two ends, fibers above the neutral axis are typically exposed to compressive stress and tensile stresses on those below the neutral axis. Portions of the member near the supports are subjected to relatively greater shear stresses than tensile stresses for this load and support system. The concrete member to be tested in this test is supported at its ends and charged by a gradually increasing load to failure at its interior locations.

Table- Flexural Strength Test Results

No.	Spec.	Grade	% rubber	Failure Load (KN)	Flexural Strength (MPa)
1	20M1	M20	0	9.3	9.55
2	20M2	M20	10	9.65	9.85
3	20M3	M20	30	7.70	6.60
4	20M4	M20	40	5.10	6.10
5	25M1	M25	0	11	11.00
6	25M2	M25	10	11.44	12.43
7	25M3	M25	30	10.1	10.10
8	25M4	M25	40	6	6.30

CONCLUSIONS

Various conclusions are drawn in this chapter on the basis of results and analysis done in the previous chapter. Scope for future study has been included in this chapter. The aims of this research were to study mechanical properties of three type of concrete namely plain concrete(PC), steel fiber

reinforced concrete (SFRC)and latex modified steel fiber reinforced concrete (PM-FRC)has been determined on the basis of various test namely compressive test , flexural test , and workability tests results carried out in laboratory. To study a high performance concrete system incorporating both fibers and polymer(PM_FRC) in term of toughness and durability also. Based on experimental investigation following conclusions may be drawn:

PMC optimization

- Polymer latex greatly increases workability (slump time and VeBe time). The addition of 15% latex will produce high resistance PMC with water / cement ratio 0.28 has the features of self compacting.
- The water – is affected by the recession, reducing the potential of the polymer; it is more effective at higher slumps than at lower slumps. This should be remembered when using both a superlasticizer and a polymer to achieve specific workability for mix designs or mix optimization..
- Compressive strength reduction is is more prone to increased latex dosage for high-strength PMC than standard PMC. A suitable healing technique is important for achieving high strength concrete with latex. This provides the required balance between suitable conditions for film forming and concrete hydration with a low water / cement ratio.
- The flexural strength continued to decline as the polymer / cement ratio increased. Under both compressive and flexural loading the PMCs still failed in a brittle fashion, although a small improvement in ductility was observed. SFRC optimization
- Steel fiber decreases operability (slump time and VeBe time). Adding 1.25 percent steel fiber to the fixed water / cement ratio indicates lowest workability 0.28. See below. Both superlasticizer and concrete air entrainment criteria.
- Its compressive strength is improved as the fiber content in concrete is decreased, showing maximum strength at 1 % of the total cement fiber content. Appropriate high water / cement ratio is used to achieve the required balance between state..
- SFRC's flexural strength seemed to increase to 1% of steel fiber and then continue to decrease. Its fiber / cement ratio is checked for variance.

PM-SFRC optimization

With-polymer dose, the workability of PM – SFRC decreases to differing degrees. To achieve a workable low w / c ratio combination, polymer / cement ratio of less than 15 percent needed additional superplasticizer. Steel fiber is more powerful than polymer fibers in terms of flexural strength and hardness without polymer in FRC. The flexural durability of the mixes was evaluated using three methods. PM10- SF1.0 was found to be the strongest blend, exhibiting strong strength and strain hardening characteristics; this combination will be good for PM-SFRC structural use. The key explanation for the superior output is the fact that the polymer-cement co-matrix improves the cement 's total binding ability. Polymer latex demonstrated varying effects on flexural actions based on the fiber material. Generally speaking, steel fiber is more likely to be strengthened by incorporating polymer than SFC. The ideal dose for SFRC was 10 per cent and for PMC was 5 per cent. Steel fiber proved to be more polymer-fibre compliant than steel fiber alone. Steel fiber plays a major position in PM-SFRCs, and thus the fibers' contribution to hardness is far greater than polymer's contribution. The improvement in hardness attributed to decreased number of fibers in the PMC matrix is distinct from that of the HSC matrix. In PMC matrix, steel fibre is more effective than in HSC simple matrix. SFRC's compressive strength analyzes for differing polymer material. The steel fiber density at which the combination indicates the optimum strength needed for further analysis. PM10-SFRC1.0 displays the overall intensity of both tests.

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