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Use of Waste TYRE as Partial Replacement of Aggregate in Concrete

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Abstract: Worldwide development in overall Scenario will be carbon diminishment and vitality sparing. Most extreme utilization of assets, effective construction, economic development and quality changes costs have turned out to be earnest issues which advances general economic development endeavours to enhance expectations for everyday comforts and solves the issues of deficiencies in assets. Reusing is acknowledged to be one of the imperative bases of supportability. Presently days we are attempting to use all sort of item, regardless of whether they are metal, solid, plastic, wood, or even glass, will in the end transform into squanders that must be arranged. The most ideal approach to manage such sort of squanders is to reusing, recuperation and reuses them as crude materials or modifiers. This will diminish the deplete on the common assets of the crude materials, and it will lessen the spaces utilized as landfills. Among every one of these squanders elastic, this is overall utilized as a part of our day by day life by immediate or roundabout behaviour.
Keyword: Biodegradable, Roundabout, Regardless, Assets, Vitality.

I. INTRODUCTION

Worldwide development in overall Scenario will be carbon diminishment and vitality sparing. Most extreme utilization of assets, proficient development, sparing development and quality enhancements costs have turned out to be dire issues which advances general monetary improvement, endeavours to enhance expectations for everyday comforts and takes care of the issues of deficiencies in assets. Reusing is acknowledged to be one of the critical bases of maintainability. Presently days we are endeavouring to use all sort of item, regardless of whether they are metal, solid, plastic, wood, or even glass, will in the long run transform into squanders that must be arranged. The most ideal approach to manage such sort of squanders is to reuse and reuse them as crude materials or modifiers. This will decrease the deplete on the regular assets of the crude materials, and it will diminish the spaces utilized as landfills. Among every one of these squanders elastic is likewise overall utilized as a part of our day by day life by a few immediate or roundabout behavior. With the quick improvement, higher expectations for everyday comforts and higher populace development, the amounts of scrap tires are relied upon to be forcefully expanded. The aggregate number of relinquished piece tires will be required to achieve 4 million tires in 2013(Ahmed. N Bdour, 2010).The transfer of elastic is not a simple issue. Elastic tires are a pliable, non-biodegradable
Material that can exist for quite a while with no debasement

A. Classification of Scrap Tires

1) Scrap Tires
2) Slit Tires
3) Shredded/Chipped Tires
4) Ground Rubber
5) Crumb Rubber
6) Schematic Production Tire

II. OBJECTIVE OF THIS STUDY

A. Solid waste management has gained a lot of attention to the research community in recent days. As involved solid waste, accumulated waste tyres, has become a significant drawback of interest attributable to its non- perishable nature [Malladi, 2004].

B. Most of the waste tyre rubbers are used as a fuel in many of the industries such as thermal power plant, cement kilns and brick kilns etc. unfortunately, this kind of usage is not environment friendly and requires high cost.

C. The use of scrap tyre rubber in the preparation of concrete has been thought as an alternative disposal of such waste to protect the environment.

D. It has been observed that the rubberized concrete may be used in places where desired deformability or toughness is more important than strength like the road foundations and bridge barriers.

E. Apart from these the rubberized concrete having the reversible physical property properties may additionally be used as a fabric with tolerable damping properties to scale back or to attenuate the structural vibration under impact effects [Siddique*et al.*2004].

III. DESIGN REQUIREMENT

In this paper different code and grade are used

A. concrete mix design (as per is 10262-2009 & mort&h)

1) A-1 Stipulations for Proportioning

a) Grade Designation M30
b) Type of Cement OPC 43 grade confirming to- IS-12269-1987
c) Maximum Nominal Aggregate- Size 20 mm
d) Minimum Cement Content (MORT&H 1700-3 A)- 310 kg/m^3
e) Maximum Water Cement Ratio (MORT&H 1700-3 A)- 0.45
f) Workability (MORT & H 1700-4)- 50-75 mm (Slump)
g) Exposure Condition- Normal
h) Degree of Supervision- Good
i) Type of Aggregate-Crushed Angular Aggregate
j) Maximum Cement Content (MORT&H Cl. 1703.2)- 540 kg/m^3
k) Chemical Admixtures-Type Super- plasticiser confirming to IS-9103

2) A-2 Test Data for Materials

a) ement Used - Birla Cement OPC 43 grade
b) Gravity of Cement - 3.15
c) Gravity of Water- 1.0
d) 4 Chemical Admixture- BASF Chemicals Company
e) Sp. Gravity of 20 mm Aggregate - 2.884
f) Sp. Gravity of 10 mm Aggregate - 2.878
g) Sp. Gravity of Sand - 2.605
h) Water Absorption of 20 mm Aggregate- 0.97%
i) Water Absorption of 10 mm Aggregate - 0.83%
j) Water Absorption of Sand -1.23%
k) Free (Surface) Moisture of 20 mm Aggregate – nil
l) Free (Surface) Moisture of the 10 mm Aggregate- nil
m) Free (Surface) Moisture of Sand – nil
n) Sieve Analysis of Individual Coarse Aggregates Separate Analysis – Done
o) Sieve Analysis of Combined Coarse Aggregates Separate Analysis – Done
p) Sp.Gravity of Combined Coarse Aggregates - 2.882
q) Sieve Analysis of Fine Aggregates Separate Analysis - Done

3) A-3 Target Strength for Mix Proportioning

a) Target Mean Strength (MORT&H 1700-5) - 47N/mm^2
b) Characteristic Strength @ 28 days - 35N/mm^2

4) A-4 Selection of Water Cement Ratio

a) Maximum Water Cement Ratio (MORT&H 1700-3 A) - 0.45
b) Adopted Water Cement Ratio- 0.4

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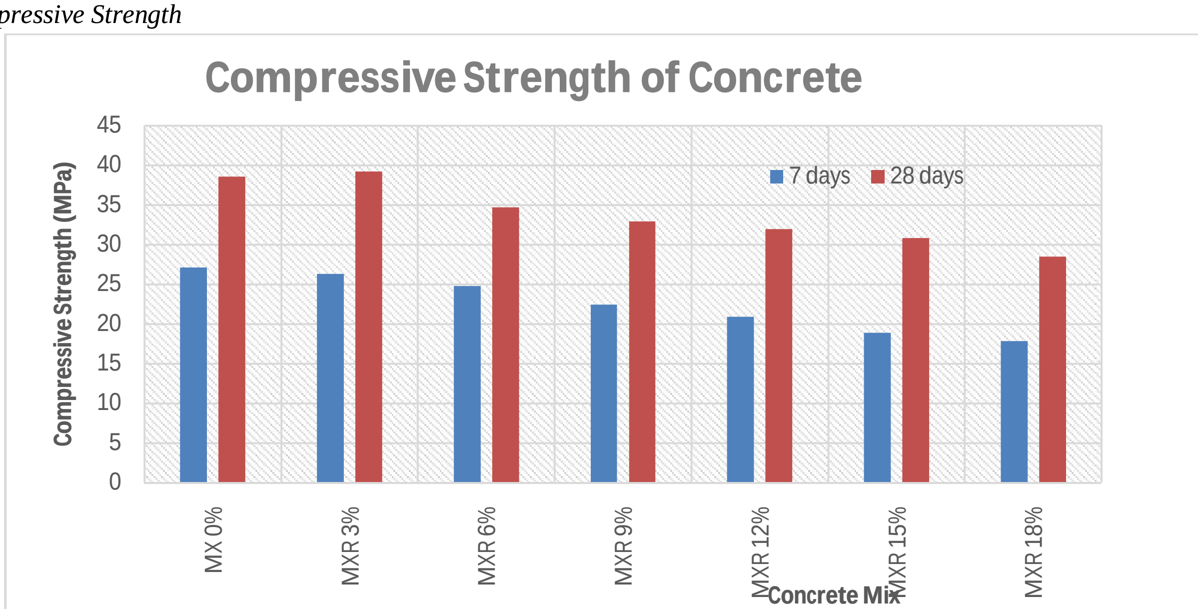
5) *A-8 Mix Calculations*
a) Volume of Concrete in m^3- 1.00
b) Volume of Cement in m^3 - 0.13Mass of Cement) / (Sp. Gravity of Cement) x1000
c) Volume of Water in m^3- 0.160Mass of Water) / (Sp. Gravity of Water) x1000
d) Volume of Admixture @ 0.5% in m^3- 0.00168Mass of Admixture)/ (Sp. Gravity of Admixture) x1000
e) Volume of All in Aggregate in m^3- 0.711Sr. no. 1 – (Sr. no. 2+3+4)
f) Volume of Coarse Aggregate in m^3- 0.441Sr. no. 5 x 0.62
g) Volume of Fine Aggregate in m^3 - 0.270Sr. no. 5 x 0.38
6) *A-9 Mix Proportions for One cum of Concrete (SSD Condition)*
a) Mass of Cement in kg/m^3- 400
b) Mass of Water in kg/m^3- 160
c) Mass of Fine Aggregate in kg/m^3 - 704Mass of Coarse Aggregate in kg/m^3- 1271Mass of the Admixture in kg/m^3- 2.00
d) Water Cement Ratio- 0.40

IV. EXPERIMENTAL PROGRAM

The main objective of this study was to utilize the waste rubber as aggregate in the concrete mixture and identify the properties of the mixture, its durability, expansion and also it's fresh and hardened concrete properties. The study started by replacing the percentage of the volume of natural aggregates, normally used in the manufacture of concrete in worldwide with waste rubber in increments of 3% by the natural aggregates were replaced by waste rubber. All concrete mixing was performed in the Concrete Laboratory in the Baddi University of Emerging Sciences & Technology. Before mixing commenced, the gradation of waste rubber samples was determined and compared with the natural aggregates. The experimental program consisted of first testing the fresh concrete properties as per IS 1199:1959, then forming specimens as per Bureau of Indian Standers (BIS) for the following tests-: IS 516:1959, Compressive Strength of Concrete Specimens. IS 1199:1959, Length Change of Hardened Concrete. IS 516:1959, Flexural Strength of Concrete.IS-5816:1999, Splitting Tensile Strength of Cylindrical Concrete Specimens. In the experimental program, the comparison of the properties of waste rubber concrete made with different percentages is done. In experimental program specimens with waste rubber (Rubberized Concrete) were prepared in specimens the coarse aggregate is replaced by different percentage of waste rubber with different percentage. Discussion about the material used is done in this chapter. The basic tests distributed on concrete samples in plastic stage also are mentioned during this chapter, by short description regarding combine move and solidifying procedure adopted. Then the various tests conducted on the specimens are discussed.

V. RESULTS

A. *Compressive Strength*



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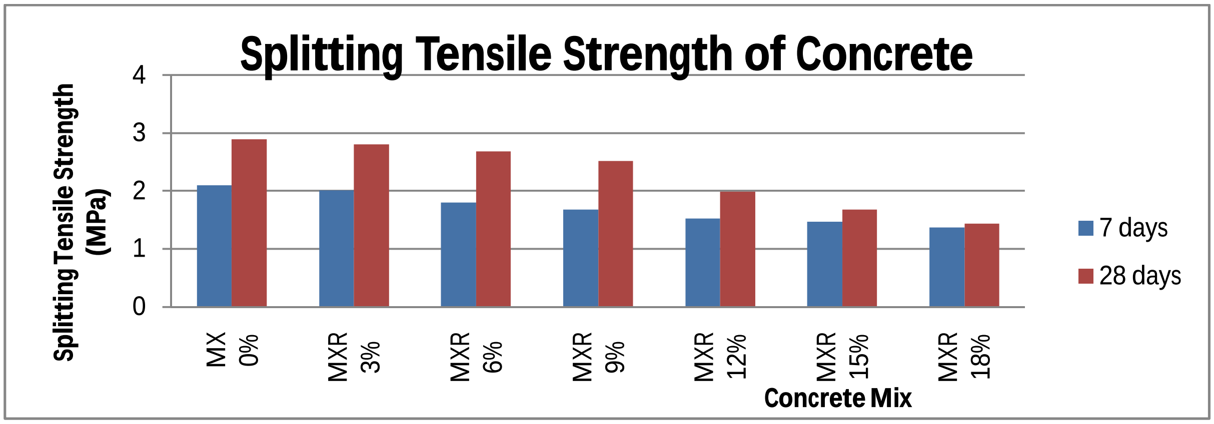
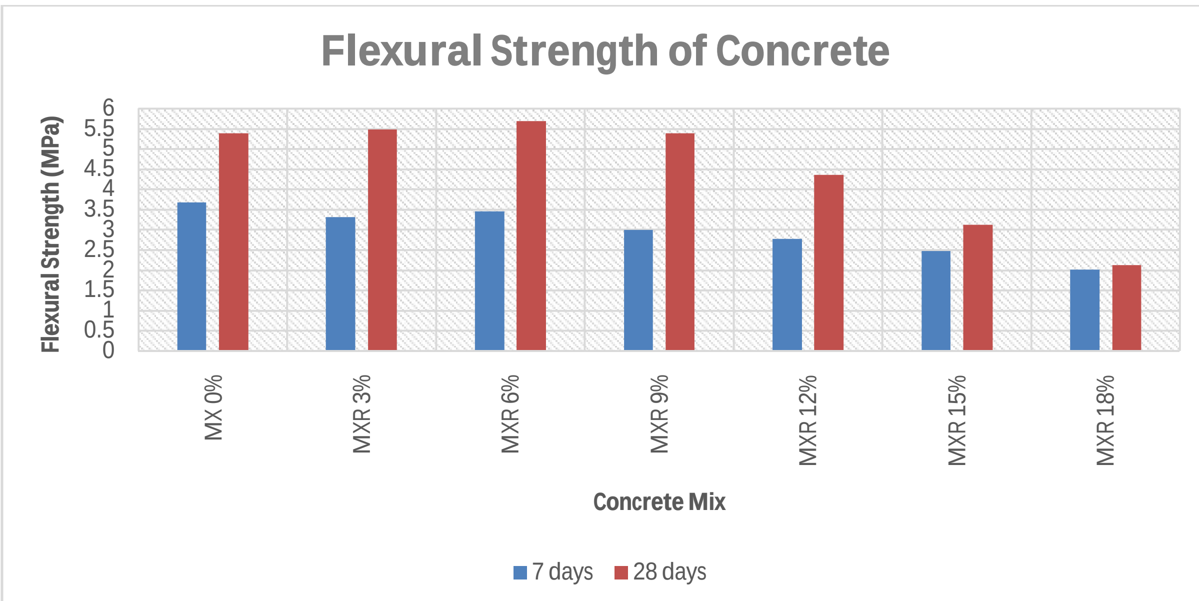
B. splitting tensile strength



C. Flexural Strength



VI. CONCLUSION

A. Slump value is decreased as the percentage of replacement of scrap tyre rubber increased. So decrease in workability.
B. The compressive strength is decreased as the percentage of replacement increased, but rubber (MXR- 03) concrete developed slightly higher compressive strength than those of without rubber (MX-00) concrete.
C. The split tensile strength is increased with decreased percentage of scrap tyre rubber.
D. Decrease in compressive strength, split tensile strength and flexural strength of the specimen.
E. Lack of proper bonding between the rubber and the cement paste matrix.
F. In the rubberized concrete the loss of strength was 45% with 15% replacement of coarse aggregate by rubber particles.

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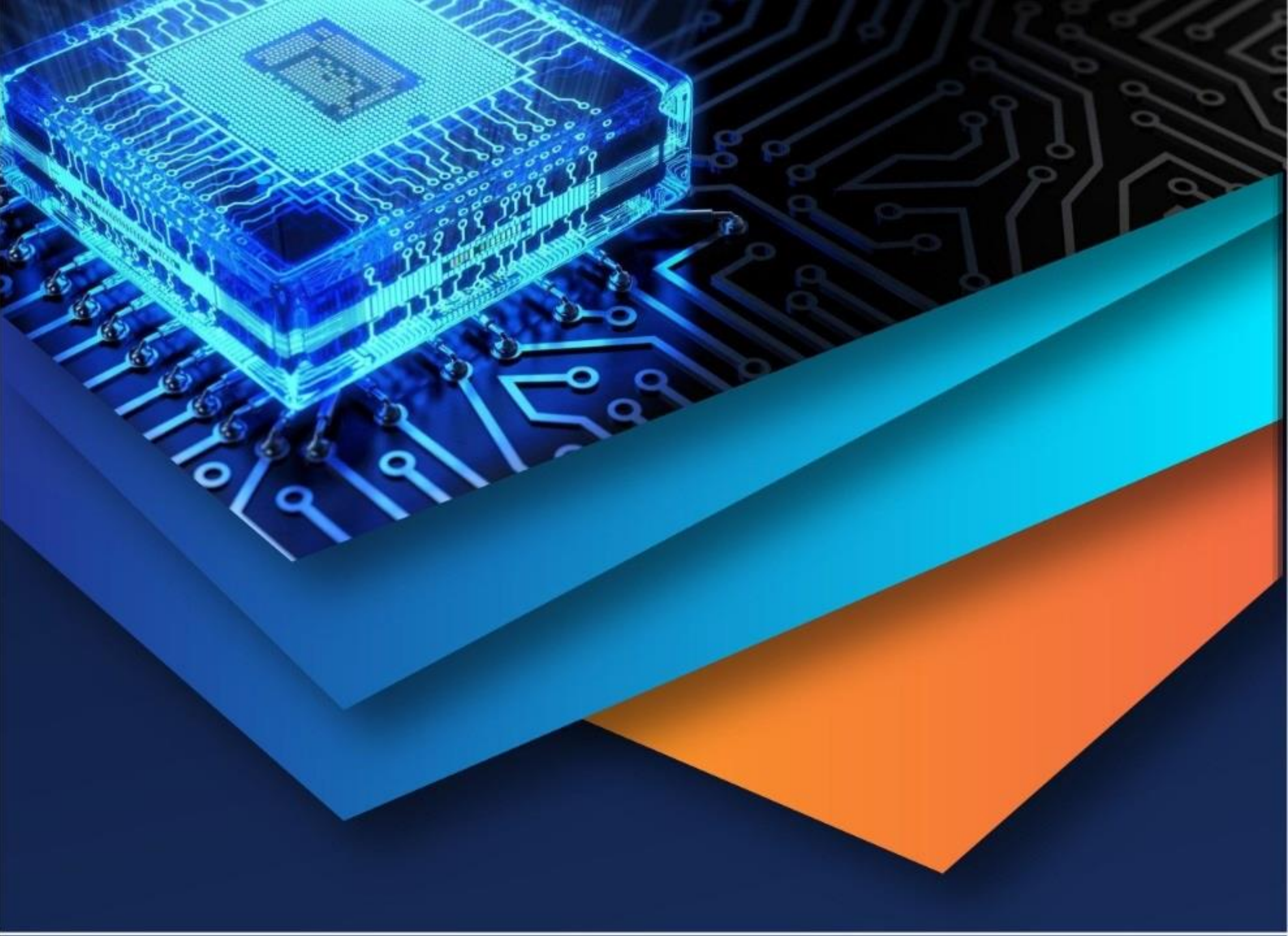

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