"USE OF WASTE TIRE RUBBER IN A PARTIAL REPLACEMENT OF AGGREGATE IN CONCRETE"

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ABSTRACT

The waste problem considered as one of the most crucial problems facing the world as a source of the environmental pollution. During last recent years, many improvement in India have occurred in all parts of life such as social, industrial, economical etc., this will lead to generate new ways of living and increase the human requirements, and will also increase types and quantities of the waste in India, without any active processes to provide solution to this problem. Waste rubber tires cause serious environmental problems all over the world. One of the potential means of utilizing the waste tires is to process this waste material for the protection of the environment and society. It is suggested to use this waste tires as an additive in portland cement concrete mixes, which would partially help in solving this problem.

Waste-Tire rubber is one of the significant environmental problems worldwide. With the increase in the automobile production, huge amounts of waste tire need to be disposed. Due to the rapid depletion of available sites for waste disposal, many countries banned the disposal of waste tire rubber in landfills The main objectives of this research were to provide more scientific evidence to support the use of legislation or incentive-based schemes to promote the reuse of accumulated waste tires. This research focused on using scrap tires as a replacement for a percentage of the local fine aggregates used in the concrete mixes. In order to prevent the environmental problem from growing, recycling tire is an innovative idea or way in this case.

Keyword: - *rubber*

1. INTRODUCTION

India manufacture 11.92 Crore tires in year 2010 – 11 increase by 22.72% than year 2009 – 10 (ATMA – Automotive Tire Manufacturer Association). With the exponential growth in number of automobiles in India during recent years, the demand of tires as original equipment and as replacement has also increased. The quantity of scrap tires produced in India is not exactly available but the increasing trend of use of road transportation will definitely create a problem of disposal in very near future. The total number of registered buses, trucks, cars/jeeps/taxis and two wheelers up to 1997 in India

were 0.5 million, 2.25 million, 4.7 million and 26 million, respectively. Considering the average life of the tires used in these vehicles as 10 years after rethreading twice, the total number of waste disposable tires will be in the order of 112 million per year. That's why this is one of the most crucial environmental issues all around the world is the disposal of the waste materials.

Controlling of waste-tire rubber is very challenging for metropolises to handle because the waste tire rubber is not easily biodegradable even after long-period of landfill treatment. However, recycling of waste tire rubber is an alternative. Tire recycling or rubber recycling is the process of recycling vehicles tires that are no longer suitable for use on vehicles due to wear or irreparable damage such as punctures or wear and tear. These tires are among the largest and most problematic sources of waste, due to the large volume produced and their durability. Those same characteristics, which make waste tires such a problem, also make them one of the most re-used waste materials, as the rubber is very resilient and can be reused in other products. Approximately, one tire is discarded per person per year. Accumulations of discarded waste tires have been a major worry because the waste rubber is not easily biodegradable even after a long-period landfill treatment. Thus it gets gathered and creates variety of problems. It creates unsightly appearance. If burnt under conventional uncontrolled fashion it creates harmful vapors. If dumped in land fill sites, in rainy seasons it collects water and harbors mosquito and fly breeding. If buried in land fill sites, it slowly decomposes under anaerobic environment and generates methane. Methane is generated by other sources also in land fill sites.

2. OBJECTIVE OF WORK

- To study the existing disposal method of tire waste.
- To investigate proportional relationship between rate of strength loss and contain of rubber in mix.
- To investigate the effect of tire waste on compaction factor of concrete.
- To investigate the effect of tire waste on compressive strength of concrete.
- To investigate the effect of tire waste on split tensile strength of concrete.

3. OVERVIEW OF PROJECT

The present work proposes to investigate the impact of tire waste combination on various parameters of concrete like cube compression strength, split tensile strength, etc. The tire waste shall be used as a substitute of coarse aggregate in varying proportions. Some researchers have reported that the loss of strength is due to the poor bonding between tire material and concrete mixtures. They have treated tire material with alkali to roughen the surface that leads to better bond formation and thus a better strength. These studies will suggest a safe and environmentally consistent method of disposal of tire waste material.

4.LITERATURE REVIEW

1) Ahangar-Asr A., Faramarzi A, & Javadi A.A. et al (1) found that, as rubber aggregate are increase there is decrease in mechanical properties of concrete depends on type and content of rubber used. A new data mining technique, named Evolutionary Polynomial Regression (EPR) is developing to predict the mechanical behavior of rubber concrete. Three separate models were developed

to predict the properties of concrete. The developed EPR models provide very accurate predictions for strength parameters of rubber concrete. (A Ahangar-Asr 2010)

2) Aiello M. A. et al (2) investigate the properties of various concrete mixture at fresh and hardened state produced by partial substitution of coarse and fine aggregate with proportion of 31.10%, 29.10%, 17.40%, 9.24%,and 8.44% by weight and having opening size 20, 16, 12.5, 10, and 8mm respectively of waste tires rubber particle having same dimension of replaced aggregate .After the analysis workability of fresh concrete is slightly improved by partial substitution of coarse and fine aggregate with rubber shreds. Reduction in the compressive strength for both type of rubcrete specimen with increase in amount of replaced aggregate. (M.A.Aiello et al 2009).

3) Azmi N. J., Mohammed B. S., Al-Mattarneh H. M. A. et al (3) had carried out a program to develop information about the mechanical properties of rubberized concretes. The results revealed that although there is a reduction in strength for crumb rubber mixture, but slump values increase as the crumb rubber content increase from0% to 30%.Means that crumb rubber mixture is more workable compare to normal concrete and can be acceptable to produce crumb rubber concretes. The results also indicated that inclusion crumb rubber in concrete reduced the static modulus elasticity. (N. J. Azmi et al 2008)

4) Batayne Malek K. Marie Iqbal, Asi Ibrahim et al (4) focused on use of crumb tires as a replacement of the local fine aggregates used in the concrete mixes in Jordan. The test results showed that even though the compressive strength is reduced when using the crumb tires, it can meet the strength requirements of light weight concrete. The mechanical test results demonstrated that the tested specimens of the crumb rubber concrete remained relatively intact after failure compared to the conventional concrete specimens. Although the strength of modified concrete is reduced with an increase in the rubber content, its lower unit weight meets the criteria of light weight concrete that fulfill the strength requirements. Although it is not recommended to use this modified concrete in structural elements where high strength is required, it can be used in many other construction elements like partition walls, road barriers, pavement, sidewalks, etc. which are in high demand in the construction industry. (Malek K. Batayne et al 2008)

5) Cairns R. A. & Kew H.Y. & Kenny M.J. et al (6) study investigates the potential of incorporating recycled rubber tire chips into ordinary Portland cement concrete. Plain rubber aggregate and rubber aggregate coated with cement paste were used. The results showed that, that concrete incorporating rubber aggregate has lower workability, unit wt. & exhibited a notable reduction in compressive strength. It does not exhibit a typical failure mode of plain concrete and a beneficial effect on flexural strength was observed. The use of rubberized concrete in concrete block probably shows the greatest potential for success at present. (Cairns R. A. 2004).

6) Durham Stephan A., Kardos Adam et al (7) having primary object of study to evaluate the reuse potential of crumb rubber in concrete mixtures for pavement application. Based on the result of this study confirms that upto 30% crumb rubber may be used for highway application and still produce concrete with the fresh and hardened properties required of such mixtures. (Stephan A. Durham et al 2012)

5. METHODOLOGY

A mix of concrete is designed using locally available materials. All required material including Cement, Sand, Gravel and rubber aggregate are characterized as per IS code methods. The tire waste is shredded in the size ranges 10 to 20 mm is added in concrete mix as a substitute of aggregate respectively in 6%, 12%, 18% proportions. The present work proposes to cast test specimen of concrete cube, cylinder for experimental study and testing. After 7 & 28 days of curing the test on various concrete specimen is taken to analyze results.

6. EXPERIMENTAL INVESTIGATION

TEST ON MATERIAL TAKEN:-
Cement-
-Fineness of cement
-Soundness test
-Compressive strength of cement
Fine Aggregate (Sand)-
-Sieve analysis & water absorption -Specific gravity of aggregate
Coarse Aggregate-
-Impact value
-Specific gravity &Water absorption
- Fineness modulus & Sieve analysis
-Crushing value
-Flakiness & Elongation Index test
20mm Scrap Tire Rubber Coarse Aggregate -
-Specific gravity &Water absorption -Flakiness & Elongation Index Test

7. MATERIALS

Natural Aggregate

Gravels are obtained by crushing natural basalt stone obtain from quarries nearby Dhule. They are hard, strong, tough, clear and free from veins, alkali, vegetable matter and other deleterious substances. Aggregates are free from such material, which will reducestrength or durability of concrete.

Sand

Natural sand free from silt, veins, alkali, vegetable matter and other deleterious substances, obtained from Tapi River Dhule.

Cement

Ultratech 53 GRADE Ordinary Portland cement is used for all mixes. Cement Ultratech 53 GRADE Ordinary Portland cement is used for all mixes.

Potable Water
Water used for drinking purpose is used for mixing and curing.

8.CONCLISION

AFTER STUDING THE ABOVE ANCEPT I HAVE OBSERVE USED OF RUBBER BY PRODUCING IN CONCREAT AND CEMENT IN SOME PERCENT IS . SO THAT I HAVE STUDY TO HOW MANY PAECENT RUBBER IS USED IN MIXTURE OF CONCREAT AND WHAT IS THERE EFFECT ON TOTAL STRENTH ON THESE.

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