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Study in Beneficial Point of Rubber Aggregate for Using in Concrete Mix: A Review

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Abstract: **In this paper study in rubber tire and collecting the data from previous research study to find out the some beneficial point of waste rubber tire for using as a aggregate with replacing the natural aggregate. At present the dumping of waste tires is becoming a major waste management problem in the world 7% is used for civil engineering construction work. Whole scrap tires have been used as culverts, retaining walls, and for slope and beach stabilization. The practice of these applications need to find out the some characteristic of waste tire.**

Keywords: **Rubber tire, application of rubber tire, properties of scrap tire.**

1. INTRODUCTION

For a country like India an efficient road network is necessary for national integration, industrial development and as well as for socio-economic development. Due to improvement in living standards of the people, the use of vehicles has increased over a last few years, giving rise in the vehicular density on roads. Due to wear and tear of tires the life of tire reduces and at last it becomes useless. The disposal of these tires has become a serious problem. These tires are disposed easily by either burning or by dumping. Disposal by burning causes air pollution and dumping causes valuable land to be wasted for stacking up the tires. So it is required to dispose these tires safely and economically. The possible use of scrap tires is in the form of tire chips and crumb rubber aggregate. With more than 250 million tires discarded annually (approximately one tire per person), its light weight and durability properties make it ideal for the reinforcing material. Use of tire chips has an advantage of being available at a very low price as well as with it comes the utilization of the waste product**.**

2. LITERATURE REVIEW

Kamil E. Kaloush et al. 2004 [1], tested various properties of concrete and compared them to concrete with rubber aggregates. they observed that as the rubber content increased, the tensile strength decreased, but the strain at failure increased. Higher tensile strain at failure is indicative of more ductile mixes. He also established that Crumb Rubber Concrete is more resistant to thermal changes.

Batayneh et al., (2008) [2], suggested that the usage of rubber in concrete is not recommended where high strength is required. It should be useful only where the high strength is not required.

G. Senthil Kumaran et al. 2008 [3], in their study concluded that the reduction of compressive strength and tensile strength can be increased by adding some super plasticizers and industrial wastes as partial replacement of cement will definitely increase the strength of waste tire rubber modified concrete. Further study is needed to increase performance against fire.

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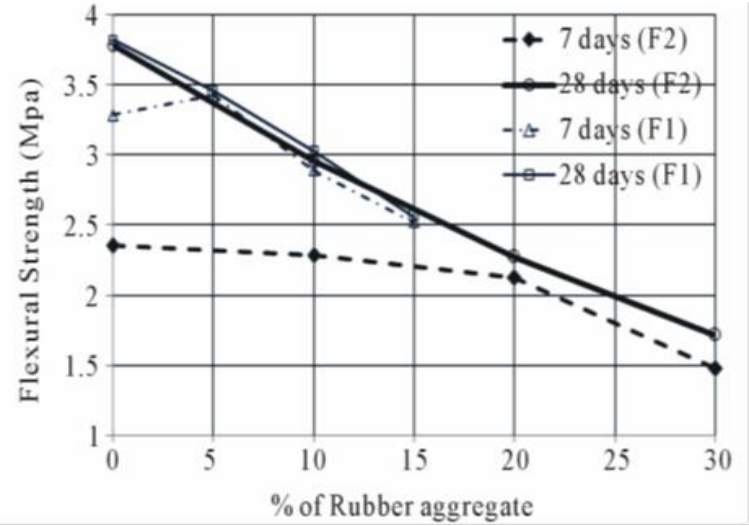
Ganjian et al., (2009) [4], were replaced coarse aggregate with tire rubber in concrete. They found that by using tire rubber in concrete, it yields to give very less compressive strength than when natural coarse aggregate used in concrete.

Zeineddine Boudaoud (2012) [5], This experimental work investigates the impact of substituting part of the conventional aggregates with rubber aggregates on certain characteristics of the cement concretes. This incorporation of rubber aggregates in practical sizes decreases the mechanical resistances of the concretes while improving slightly the flexibility of the tested mixtures, even very interesting for the concretes used. This technique of cutting worn tires without any further treatment makes it accessible to everyone which helps not only in saving the environment by getting free of this bulky waste but also in saving traditional aggregates.



D. Pedro (2013) [6], this work presents a performance-based analysis to test the viability of using these modified mortars for wall coatings. It presents unprecedented analyses of some durability-related properties and the influence of the crushing process in the overall performance of mortars incorporating rubber. Even though the results show, as expected, that the incorporation of rubber particles is detrimental to both compressive and flexural strength, those changes do not impair its use as renders under normal conditions. Furthermore, the incorporation of rubber leads to a significant reduction of the modulus of elasticity of the mortar. The added rubber also improves its impact-resistance characteristics and some other durability characteristics of these modified mortars compared with those of conventional mortars.

S. F. A. Shah et al . 2014[7], did a study on the thermal properties of rubberized concrete in 2014. The testing was done by incorporating 5, 10 and 15% of scrap rubber as volume replacement for coarse aggregate. Thermal behavior for concrete was examined using hotbox technique. No remarkable changes in concrete properties up to 5% replacement were occurred. Beyond 5% substitution, concrete properties change appreciably. Compressive strength, flexure strength, workability, stiffness and unit weight of rubberized concrete decreased as rubber content increased. While impact resistance, air content and water absorption of rubberized concrete increased with increase in rubber content. Thermal performance of concrete containing rubber aggregate was improved, and promising results were obtained. It was concluded that rubberized concrete could be useful in slabs to improve energy efficiency of building unit.

Falak O. Abas (2015) [8], In this paper two types of waste tires are used as (chips and grounded shape) applied experiments and tested their mechanical, physical and chemical properties in order to determine the optimal enhancing replacement ratios of waste tires as (dry density, compressive and flexural strength, performing slump, and toughness indices) at curing ages of (3, 7, 28 and 56 days) for standard and improved concrete mix. The results for tests show a decline in compressive strength of the concrete in other hand an increase in their toughness with good approach properties and reduce the cost of additive materials, also solve a serious problem posed by waste tires. The compressive strength values of all waste tires rubber concrete mixtures have a tendency to decrease below the values for the reference concrete mixtures with the increasing of waste tires rubber ratio at all curing age. The flexural strength values of waste tires rubber concrete mixtures have a tendency to decrease below values for the referent concrete mixtures with increasing the waste tires rubber ratio.

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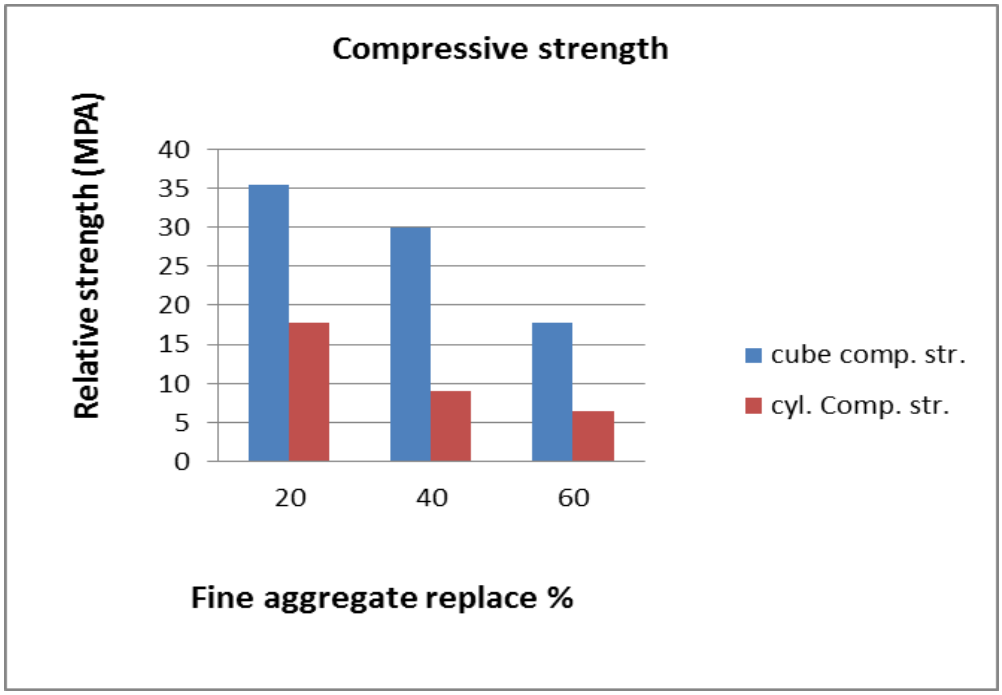
Haolin Su and **Jian Yang et al. 2015 [9],** conducted a study in which three groups of singly-sized rubber particle samples (3 mm, 0.5 mm and 0.3 mm) and one sample of continuous size grading were used to replace 20% of the natural fine aggregate by volume. It was observed that the rubber particle size affects the concrete's workability and water permeability to a greater extent than the fresh density and strength. Concrete with rubber particles of larger size tends to have a higher workability and fresh density than that with smaller particle sizes. However, the rubber aggregates with smaller or continuously graded particle sizes are shown to have higher strengths and lower water permeability.

Tushar R More et al. 2015 [10], got the conclusions that, addition of recycled crumb rubber aggregates into normal concrete mix leads to decrease in workability for the various mix samples. Flexural strength of concrete decreases about 40% when 3% sand is replaced by crumb rubber aggregates and further decrease in strength with increase of percentage of crumb rubber aggregates. Split tensile strength of concrete decreases about 30% corresponding to 3% sand replaced by crumb rubber and further decreases the strength with increase in percentage of crumb rubber. One of the reasons that splitting tensile strength of rubberized concrete is lower than conventional concrete because of bond strength between cement paste and rubber tire aggregates poor. The rubberized concrete can be used in non-load bearing member's, i.e., lightweight concrete walls, other light architectural units, thus concrete containing fine rubber aggregates could give a viable alternative to where strength is not prime requirements. Experimental results of study show that it is possible to use recycled rubber tire in terms of aggregates in concrete construction as partial replacement to natural fine aggregates

Muhammad B. Waris (2016) [11] The paper investigates possible use of recycled tire in concrete for partial fine aggregate replacement to provide possible solution for tire waste management as well as aggregate resource conservation. Commercially produced tire crumbs of size ranging between 0.80 to 4.0 mm were used for partial replacement of fine aggregates in concrete. Three fractions of 20%, 40% and 60% replacement were considered in addition to a control mix.



3. CONCLUSION

Based on the results and then analysis, the following conclusions have been arrived it, it is clear that rubberized concrete and be used in a wide amount of areas. Fire resistance of rubberized concrete is greater than normal mixes. . Reuse of scrap tires would not only provide a means of disposing of them but would also help solve difficult economic and technical problems. The tire derived aggregate is its low unit weight. The unit weight of compacted TDA is 1/3 to one half that of typical compacted soil. In addition high thermal insulation capacity, good vibration damping, and high compressibility are beneficial for some application

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