

“Review Paper on Waste Tyre Crumb Rubber Particle as a Partial Replacement to Coarse Aggregate in Concrete .”

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Abstract – Waste tyre management is a serious global concern. Dumping or disposals of these waste products are causes environmental and health issues. This project can be investigates wide range of physical and mechanical properties of concrete containing recycled tyre aggregates. Waste tyres are crushed into coarse particles of various sizes and are used to replace coarse aggregate in concrete. Coarse scrap tyre aggregates are added as 10%, 15%, 20% increment to replace coarse aggregate, this study aims to investigate the optimal use of these wastes as coarse aggregate in concrete composite. Compressive strength, split tensile strength and flexural strength of various mixes of concrete added with these wastes were found. Rubber which is generated in the more quantities as waste doesn't have useful disposal till now. But rubber is found to be possessing properties that are required for viable replacement of coarse aggregate in concrete. Hence in this project we have to study the effectiveness of rubber as replacement for the coarse aggregate and utilize the crumbed rubber tyres in concrete, to minimize global warming. Aggregate properties which are specific gravity, water absorption, acid resistance were to be conducted to ascertain the properties concrete specimens were to be casted and tested for concrete mix with various percentage of replacement (10%,15% &20%) and its variability for replacement are discussed in this project.

Key Words: Waste tyre Rubber, Compressive Strength, Split Tensile Strength, Flexural Strength, slump test etc.

1. INTRODUCTION

Scrap tyres of various automobiles are continuously accumulated in the landfills all over the world. After the service life of two wheeler tyres is over their storage and disposal becomes a challenging problem for the municipal authorities. The municipal authorities in many countries have already banned dumping of waste tires into the landfills due to the above-mentioned problems hence their disposal

needs a viable and environmental friendly solution. Different methods have been adopted for the disposal of scrap tyres. They includes use of tyres as fuel, ground rubber applications for play-ground or sports surfacing or used in new rubber products and also used in asphalt rubber modified concrete. Some of the other civil engineering applications includes such as road and landfill construction, septic tank construction etc. Remaining tyres are disposed of into the landfills. Use of waste tyre rubber particle in concrete can give an efficient way of utilizing rubber and by using rubber in concrete gives better environmental benefits.

The waste tire rubber provides a concrete with good engineering properties by partial replacement of waste tyre crumb rubber particle to the coarse aggregate in concrete. Each of these waste products can be provided a specific effect on the properties of fresh and hardened concrete. The use of waste products in concrete makes it economical, as well as helps in reducing disposal problems. The reuse of bulky wastes which is considered the best environmental alternative for solving the problem of disposal. Hence an attempt has been made for replacements of coarse aggregate in concrete by reduce the quantity of river sand used and environmental benefits. Besides, it will also have an effect on decreasing concrete costs of cement representing more than 27% of the concrete cost.

2. REQUIRED MATERIAL

In this study is used to, the basic ingredients of rubberized concrete and its products, which were used in this research work are

1. OPC 53 grade ultra tech cement.
2. Natural Coarse aggregate (sedimentary rock source).
3. Natural Fine aggregate (sand).
4. Water (fresh drinkable water).
5. Coarse crumb rubber.

3. MATERIAL DISCRIPTION

3.1. OPC Cement

In this study we have used Ordinary Portland cement and used for M25 grade of concrete. Also Concrete mix design in the present investigation the existing method as per IS: 10262-2009 has been used for selecting the reference mix (M25) and cement will be collected from location of Solapur-Maharashtra from the periphery of Akluj city. Cement which is a popular binding material it is highly important civil engineering material. By using various methods we can check the physical and chemical properties of cement.

3.2. Fine aggregate

In this study we are naturally occurring river sand are used as fine aggregate.

1. Size:- Fine aggregate particle of size passing through 1.18mm IS sieve and retaining on 600 μ IS sieve are used.

2. Shape:- Also use in this concrete rounded shape fine aggregate. Shape of aggregate is an important characteristic since it affects the workability of concrete and its strength also.

3. Strength:- The strength of aggregate alone cannot ensure strength of concrete. Strength of coarse aggregate is more important.

4. Surface Texture:- Generally rough surfaced aggregate is preferable to smooth aggregates. This property is also related with coarse aggregate.

3.3. Coarse aggregate

In this study we are naturally occurring crushed stone aggregate are used as coarse aggregate.

1. Size: Fine aggregate particle of size passing through 10mm IS sieve and retaining on 4.75mm IS sieves are used.

2. Shape: Also use in this concrete angular shape coarse aggregate. Shape of aggregate is an important characteristic since it affects the workability of concrete and its strength also. Shape of aggregate is an important in coarse aggregate than fine aggregate.

3. Strength: The Strength of coarse aggregate is more important.

4. Surface Texture: The rough texture aggregate develops higher bond strength in tension than smooth textured aggregate.

3.4. Scrap Tyres

Crumb rubber made by shredding process of used waste automobile tyres and in tyre remolding plant also crumb rubber is generated. To improve the bond connection between rubber aggregate and gravel.

1. Size: waste tyre crumb rubber particle of size passing through 10 mm IS sieve and retaining on 4.75 mm IS sieves are used.

2. Shape: also use in this concrete angular shape broken tyres.

3. Specific gravity: The apparent specific gravities of tyre shreds depend on the amount of glass belting or steel wire in the tyre, and range from 1.02 to 1.27. For comparison, the specific gravity for soil typically ranges between 2.6 to 2.8, which are more than twice as heavy as tyre shreds

4. Surface texture: Rubber particles produced in the granulation process generally have a cut surface shape and rough texture.

The most important properties of crumb rubber is elasticity.

4. METHODOLOGY

Crumb rubber sample will be collected from location of Solapur-Maharashtra from the periphery of Akluj motors garage And other sample is cement, sand, aggregate collected from location of in Akluj city. from this work, it will help to improve the characteristics/ properties of the concrete by analyzing the compressive Strength of concrete and its effect on the properties of the concrete. The compressive Strength, durability, toughness of the concrete will be improved with some additives with the replaced of coarse aggregate such as pieces of tires. Tyre rubber may replace air entraining Tyre rubber may replace air entraining in cold weather applications and; it will studied that the influences of improvement of compressive Strength, Splitting tensile test, Flexural test, toughness of concrete and other properties of the concrete. And the following test will be conducted on these concrete blocks.

1. Gradation (Generally Uniformly Graded)
2. Specific Gravity
3. Toughness
4. Absorption Capacity
5. Unit Weight
6. Air Content
7. Stiffness
8. Durability
9. Compressive strength test
10. Splitting tensile test
11. Flexural test
12. Modulus of Elasticity
13. Shrinkage

5. ANALYSIS

In this project we have used waste material as a admixture. In waste material we have used scrap tyre. Decomposition of waste tire rubber can take longer than 50 years, and every year the number of discarded tires is rapidly growing .so that we have used the pieces of scrap tyres that are used as coarse aggregate. We have waste scrap Tire Crumb Rubber Particle as A Partial Replacement with coarse Aggregate in Concrete. we have pieces of that scrap tire particles of size passing through 10mm IS sieves and retained on 4.75mm IS sieve used in concrete in this project. Those pieces are also called as crumb rubber.

We are the waste tyre crumb rubber particles was used to replace coarse aggregate in concrete of size passing through 10mm IS sieve and retaining on 4.75mm IS sieve at ratios 10%, 15%, 20% addition to the weight of cement are used to regain the reduced strength of concrete due to the use of waste tyre crumb rubber particle. In this we have created different blocks according to different percentage of crumb rubber particles and measured the strength of those blocks as well as the properties of concrete.

We are measured the three types of strength those blocks first one is the compressive strength second is the flexural strength and third one is the split tensile strength. In this study different concrete batches with varying proportions of crumbed rubber partially replaced to coarse aggregate to the weight of cement which is used to preparation of cast cubes, beams and cylinders. For each proportion 3 cubes (150x150x150) mm, 3 beams (150x150x700) and 3 cylinders of dia. 150 mm and 300 mm length were cast. And test was conducted after 7days and 28days of curing, to check compressive, split tensile and flexural strength of concrete.

6. OBJECTIVES

1. To clarify that the effect of rubber particle size on the properties of rubber concrete.
2. Higher content of waste tyre crumb rubber particle in concrete increases workability of concrete.
3. Higher content of waste tyre crumb rubber produces the light weight concrete.
4. Further investigation is necessary to improve the hardened properties of rubber filled concrete, to gain the loss strength due to the use of waste tyre crumb rubber at higher content in concrete mix.
5. The use of crumb rubber in concrete mix is very much beneficial to environmental concern and to solve the problem related to disposal of waste tyre rubber throughout the world.

7. FUTURE SCOPE

1. Large scale exploration of natural aggregate and expensive transportation cost, it has becomes necessary to find any other alternative of natural aggregate.
2. Replacement of natural aggregate will not only save the natural sources for future generation but will also prevent the environment by using waste material as a natural aggregate.
3. We will replace waste rubber with course aggregate up to 15% and find the optimum value of replacement. Further improving the properties of concrete we also used some plasticizer in rubber waste concrete.
4. Utilization of waste rubber tire in flexible pavement construction.

8. CONCLUSIONS

The main objective of this review article was a literature overview of fresh and hardened properties of self-compacting concrete with partially replaced natural coarse aggregate with recycled aggregate material. From this, it can be concluded: This study represents the effect of waste tyre crumb rubber particle of size passing through 10mm IS sieve and retained on 4.75mm IS sieve used in concrete on compressive, flexural and split tensile strength compare with similar normal concrete mix. Safe disposal of waste tyre , preventing it from causing pollution and diseases. Self-weight of concrete is reduced with the addition of tyre particle, so it can be used as lightweight concrete. Cost effective solution. The investigation which is necessary for improving the hardened properties of rubber filled concrete, to gain the loss strength due to the use of waste tyre crumb rubber at higher content in concrete mix. The use of crumbed rubber in concrete mix is most much beneficial to environmental concern and to solve the problem related to disposal of waste tyre rubber throughout the world. The waste tire rubber can be used as the replacement aggregate material in self-compacting concrete.

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