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Concrete Containing Crumb Rubber and Slag Cement

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Abstract- **The treatment, utilization and disposal of scrap tyre rubber is major environmental issue. Up till now only small quantity of scrap tyreis recycled and remaining is dump, ignited and landfill. The manufacturing growth rate of tyre is increasing at a very fast rate. One of the possible solutions for the reuse of scrap type rubber is to incorporate it into concrete in the form of crumb rubber by replacing some of proportion of the coarse aggregate. This project study has been conducted by replacement of aggregate with crumb rubber and replacement of whole quantity of cement with slag cement. Addition of crumb rubber is done by 3%, 5%, 7% of total weight of coarse aggregate. After casting and curing, compressive strength and flexural strength test had been performed to find strength of the concrete and behavior of the concrete under the test has been studied.**

Key Words**- Slag Cement, Crumb Rubber, Compressive strength, Flexural Strength, SC- Slag cement, CR – Crumb Rubber, CA – Coarse Aggregate, FA – Fine Aggregate, UTM – Universal Testing Machine, CTM – Compressive Testing Machine**

I. INTRODUCTION

In worldwide overall one billion of scrap tyre is generated and then it is sent for disposal after useful life of tyre[1.]. In India approximately 6 – 7% of total scraptyre generated. with rapid development increase rate of scrap tries 12% per annum [1.]. According to Hindustan times 2016 data survey the 7% of tyre rubber is recycled,11% is burned for fuel, and 5% is exported for processing, the remaining 77% is dumped, land filled [1.]which is major concern because it requires 15 years or more to decompose. The utilization and treatment of type rubber is not easy. One of the alternative solution to this problem is to reuse crumb rubber in concrete with replacement of coarse aggregate .Crumb rubber concrete has better sound insulation property and heat insulation. Therefore, in this study crumb rubber which is the waste product of scrap type and slag cement which is the waste product of steel is used.

1. Aim

To study behavior of concrete at different proportion of crumb rubber with slag cement.

2. Objective

To study variation of the compressive strength, flexural strength of the concrete containing crumb rubber with slag cement.

II. EXPERIMENTAL METHODOLOGY

The cube has been casted for M 20 grade by preparing mix design as per IS 456 2000[2] and IS 10262 (2009)[3]. The scraptyre has been cut into the 10mm size, the cut pieces of scrap tyre are crumb rubbers, Further screening of the CR has been done with the help of sieve analysis. After screening CR is kept in water for 24 hrs to avoid any adverse effect on water cement ratio. 3cubes of size 150mmx150mmx150mm&beam of size 500mmx100mmx100mmfor ordinary Concrete. &replacement of aggregate with crumb rubber and replacement of whole quantity of cement with slag cement. Addition of crumb rubber is done by 3%, 5%, 7% of total weight of coarse aggregate. After curing the cubes and beam are tested on 7 & 28 days. Following are the material used for the study: Ordinary Portland cement of 53 grade having specific gravity 3.15. slag cement of specific gravity 2.9.natural river sand, coarse aggregate of 20mm and 10mm size, crumb Rubber of bicyclescrap tyre. The results at for the compressive and flexural strength for 7 & 28 days are given in the following graph

IV. RESULTS AND DISCUSSIONS

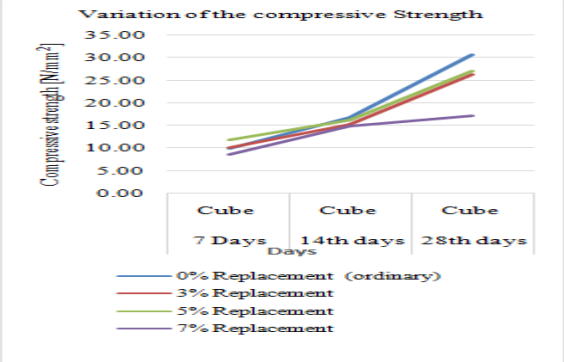

Fig. 1 Variation of the Compressive Strength.

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Graph showing variation of Compressive strength, Flexural Strength with 3%,5% & 7% replacement of crumb rubber with 10mm size aggregates are as follows.

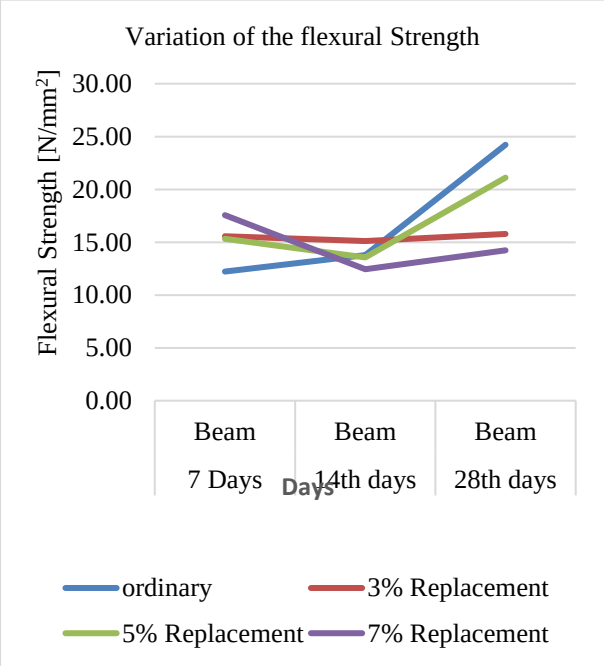

Fig. 2 Variation of the Flexural Strength.

Table 1Variation of the Compressive Strength, Flexural Strength and Cost.

Description	28th day strength (N/mm²)		Cost/ cum in Rs.
Concrete with	Compression	Flexural	
Ordinary Portland cement	30.66	24.22	7365
3% of CR by the weight of CA and 100% of SC	26.27	15.78	7350
5% of CR by the weight of CA and 100% of SC	27.13	21.11	7335
7% of CR by the weight of CA and 100% of SC	17.26	14.22	7330

V. CONCLUSION

Form the above graph and table it can be concluded that with the 5% replacement of CR with 10mm sizecoarse aggregate and replacing cement as a whole with SC gives 27.13 N/mm^2 Compressive strength and 21.11 N/mm^{2}flexural strength and will bring down thecost upto0.4% as compared to OPC. With the use of the crumb rubber we can try to reduce the adverse effect of disposal of crumb rubber on environment

VI. FUTURE SCOPE

It can be used for construction of high-speed expressways, Heavy cantilever Retaining wall, OH Water Tank, Underground water tank, and all other Miscellaneous work. By further extensive research it can be found it is best alternative of sand. . with different proportions the further research can be carried out.

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