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Crumb Rubber A Alternate Waste Material To Produce Light Weight Concrete and Sustainable Concrete in the New Millennium

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Abstract- Generally, aims to explore the potential utilization of waste crumb Crumbs in various Portland Cement Concrete categories for the production of non-structural Portland cement concrete to study the structural behaviour of concrete, and to help partially solving environmental problem produced from disposing waste Crumbs.

Keywords— crumb rubber, utilization, compressive strength, light weight concrete, sustainable

I. INTRODUCTION

The construction industry is revolutionizing in two major ways. One way is the development of construction techniques, such as using automated tools in construction. The other is the advancement in high-performance construction materials, such as the introduction of high strength concrete. Among these high-performance materials is composites made from Crumb Fibre Reinforced concrete, which is gradually gaining acceptance from civil engineers. In recent years, research and development of fibers and matrix materials and fabrication process related to construction industry have grown rapidly.

This is an environment friendly approach in the field of pavement construction as almost all sorts of Crumb waste can be recycled and used as a reinforcing admixture in the concrete pavements. Instead of disposing it we can efficiently make use of its properties in the pavement construction. Workout the difference between Ordinary Cement Concrete and Fibre Concrete experimental program is arranged.

II. INDIAN TYRE HISTORY

The waste usually defined as the all remains things resulted from production, transfer and uses processes, and in general all transmitted things and resources that the owner or the producer wants to dispose or must dispose to prevent the risk on the health of the human and save the environment in general.

A. General details

nsumption world ranking	n
Total number of Tyre Companies	
Total number of Tyre Factories	
Tyre Production 2012-13 (Estimated)	0 Million
Industry Turnover (Estimated)	. 31000 Crores
Capacity Utilization (Estimated)	%
Growth in Truck & Bus tyre production	%

Source: Indian rubber industry statistics

B. Classification of waste tyre according to partical size

Material	Size
Cuts	300 mm
Shred	-300 mm
Chips	-50 mm
Granulate	10 mm
Powder	1 mm
Fine Powder	500 µm

Buffing's	40 mm
Reclaim	epends on input
Devulcanisate	epends on powder
Pyroliticchar	0mm
Carbon products	00µm

Source: http://ebooks.narotama.ac.id

C. Chemical composition of waste tyres

CONSTITUENT	PERCENT (%)
Rubber (Natural and synthetic)	38
Fillers (Carbon black, silica, carbon chalk)	30
Reinforcing materials (steel, rayon, nylon)	16
Plasticizers (oils and resins)	10
Chemicals for vulcanisation (sulphur, zinc oxide, various chemicals)	04
Chemicals as antioxidants to counter ozone effects and material fatigue	01
Miscellaneous	01

Source:- http://ebooks.narotama.ac.id

III. PROPERTIES OF EXPERIMENTAL MATERIALS

A. Chemical analysis of crumb and type i cement used in the study

Component (%)	CRUMB	CEMENT
SiO_2	26.5	21.2
$Al2O_3$	8.7	5.5
Fe_2O_3	9.3	3.1
CaO	12.9	63.7
MgO	6.4	1.5
SO_3	1.6	2.63
Na_2O	1.4	0.18
K_2O	1.1	0.71
TiO_2	1.0	-
Cl	0.1	-
Zn	20.2	-
Loss on ignition	10.6	0.96

B. PHYSICAL PROPERTIES OF CRUMB AND TYPE I CEMENT USED IN THE STUDY

PROPERTIES	UNIT	CRUMB	CEMENT
Specific Gravity	-	2.21	3.15
Passing 45 µm	%	90	78
Median Grain Size	45 µm	13	18
Blaine Specific Surface	m^2/kg	410	300
Initial Setting Time	Minute	-	145
Final Setting Time	Minute	-	270

IV. EXPERIMENTAL METHODOLOGY AND WORK

A mix M20 grade was designed as per Indian Standard (IS 10262-2009) method and the same was used to prepare the test samples. The design mix proportion is done in following proportion.

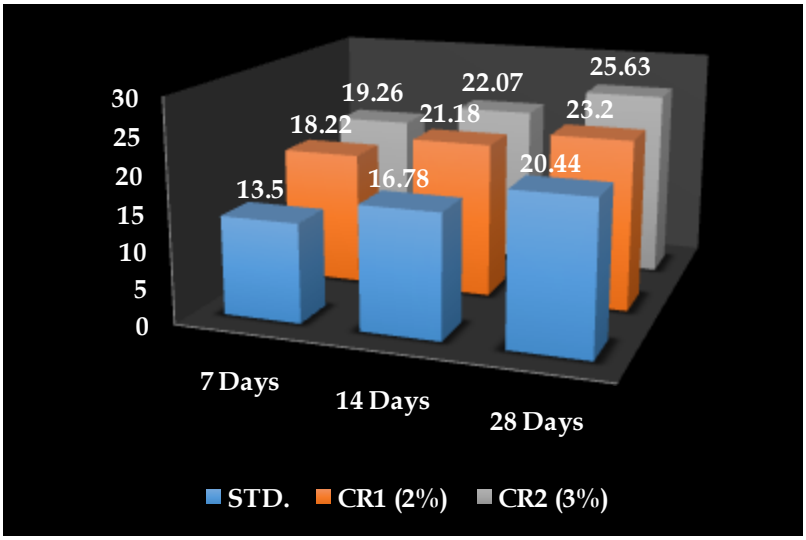
	WATER	CEMENT	FINE AGGRIGATE	COARSE AGGREGATE
BY WEIGHT, [KG]	191.60	383	555.35	1149.00
BY VOLUME	0.50	1	1.45	3.00

NAME	WATER (Litter)	CEMENT (Kg)	AGGREGATE (Kg)		SAND (Kg)	CRUMB UBBER (Kg)
			I	II		
STD.	25.00	50.00	90.00	60.00	75.00	00.00
CR_1(2%)	25.00	50.00	90.00	60.00	69.50	05.50
CR_2(3%)	25.00	50.00	90.00	60.00	66.75	08.25

Raw materials of coarse and fine aggregate used in this paper were tested, fine aggregate (sand) was replaced using wait batching method by waste crumb rubber. Fine Aggregate is replaced with 2% and 3% by waste Crumb Rubber. After this Replacement various tests were conducted on concrete.

V. RESULTS FOR COMPRESSIVE STRENGTH

COMPRESSIVE STRENGTH (N/mm^2)	7 Days	14 Days	28 Days
STD.	13.50	16.78	20.44
CR_1 (2%)	18.22	21.18	23.20
CR_2 (3%)	19.26	22.07	25.63



Fibre reinforced polymer concrete are more efficient than ordinary cement concrete pavement. This is an environment friendly approach in the field of pavement construction as almost all sorts of Crumb waste can be recycled and used as a reinforcing admixture in the concrete pavements. Instead of disposing it we can efficiently make use of its properties in the pavement construction. In this, different tests are conducted like, Compressive Test, Slump Test & etc. are conducted and results are taken. This result shows the improvement in Strength of Concrete.

By adding 2% & 3% of adding fibre in M20 grade concrete the compressive strength of concrete is increase and weight is reduced.

- ✓ STRENGTH INCREASE OF 14 DAYS IS AROUND 16%
- ✓ STRENGTH INCREASE OF 28 DAYS IS AROUND 26%

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