EXPREMENTAL STUDY OF PARTIAL REPLACMENT OF COARSE AGGREGATE WITH WASTE CONVEYOR BELT PIECES IN CONCRETE

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ABSTRACT

The management of solid industrial waste is one of the big challenge in now a days. The majority of the industries are not interested in the treatment and safe disposal of waste due to its high cost involvement. It causes the environmental and other ecological impact. In thermal power plant industries used the conveyor belt as transfer the lignite from source to plant
.after the utility period of conveyor belt is stored and not disposed. We investigate to using the waste conveyor belt pieces in concrete. The waste conveyor belt cannot be used separately in concrete. Its should be pieced and surface is coated with sand by dipping into epoxy resin and then coated sand. Than it should be dried in three days. In this investigation the belt conveyor is replaced in concrete having mix proportion of 1:1.5:3(M20 grade concrete) was analyzed. Coarse aggregate was replaced with conveyor belt pieces of 10%, 20%,30% by weight. The compressive strength test is performed for all replacement level of conveyor belt at different curing period of (14 and 28 days). Then the test are analyzed. This study is also aim to encourage the effective use in industrial waste in concrete.

KEYWORDS: coarse aggregate, conveyor belt, replacement

INTRODUCTION

The main aim of the investigation is to replace the coarse aggregate using waste conveyor belt pieces. now a days the coarse aggregate is very demand and availability of natural resources are decreasing day by day, so to over come this problem we have proposed to recycle the used materials there by to decrease in demand of natural resources. Based on the above idea, we have introduced partial replacement of coarse aggregate with "waste conveyor belt" in concrete. Generally conveyor are flat and made from an elastic material like rubber. A typical flat belt conveyor has two or more layers for added durability and wear resistance. The core material is a fabric or wire mesh. Common example include aramid fiber, polyester, cotton, steel, stainless steel or galvanized steel. This core is coated layer on the either side of the wire mash. Manufacture can made these layers using variety of material, as long as the chosen material is durable, strong and capable of operating without interruption. The material may also either be flexible and completely seamless or made up of a series of hard but light pieces. Manufactures most commonly select rubber as a belt material, but they often also choose a plastic like PVC, or polyurethane.

LITERATURE REVIEW GENERAL

India is a developing country, it propose multipurpose development projects. Every budget proposal involves large

construction of roads, bridges, dams, irrigation schemes, public health engineering schemes, educational buildings and residential buildings, etc., all these construction schemes demand optimum and efficient use of constructions resource. Most of the modern heavy construction require huge quantity of cement concrete incurs depletion of nature resources such as river sand and crushed rocks particles is rapidly increasing because of inadequate raw materials and rise of transport cost due to the hike in fuel price and other inputs.

TITTLE: Partial replacement of coarse aggregate in concrete by waste rubber tire

AUTHOR: Mr.A.Chandran

CONTENT: The international journal of engineering and techniques- volume 3 states that the outline the use of rubberized concrete in structural and non- structural member and show now it is suitable for the concrete its uses. Barriers and benefits to future study by using waste rubber. Finally he concluded of recycled rubber tires into concrete mix leads to decrease in slump and workability for the various mix sample the addition of rubber aggregate resulting to significant reduction in compressive strength compared to conventional concrete. Which is the range of 28.95% to 55.21%. although the compressive strength still in the reasonable range for the 5% replacement the over all result of this study show that it is possible to use recycled rubber tire aggregate in concrete construction as partial replacement to mineral coarse aggregate.

TITLE: Experiments study of R.M of coarse aggregate by rubber chips in concrete.

AUTHOR: Mr. Partha saika, OwaisMushcaq,

A.Arunga CONTENT: They are investigated

the use of waste tire rubber chips are partially replaced in concrete at various percentages of 4%, 8%,12% and 12% at 7 days curing period. Finally they concluded 4% replacement of waste tire rubber chips in concrete attain the maximum strength compared to other percentage of replacement.

Title: Experimental study on replacing waste rubber

as coarse aggregate AUTHOR: K.Paul Sibiyone,

M.L.enin sundo

CONTENT: International journal of chemo tech research says that the use of rubber waste as partial replacement of coarse aggregate in concrete. Different partial replacement of flap rubber as 10%, 20%, 30% and 40% by volume of coarse aggregate. In test result state flap rubber mixture is more workable compare to normal concrete and also useful in marking right weight concrete. Finally they concluded that the maximum strength is obtained by 10% replacement of coarse aggregate even 40% of replacement of coarse aggregate give more strength then the nominal concrete. Rubberized concrete strength may be improved by improving the bond properties of rubber aggregate.

TITLE: An experiment study on partial replacement of coarse aggregate by crumb rubber

AUTHOR: T.Ishwarya

CONTENT: International Research journal of engineering and technology state that research of use of recycled waste rubber tire in concrete. Its used in construction industry due to its light weight, elasticity, energy adsorption, sound and heat insulating property. Recycled waste rubber tire to replacement coarse aggregate by weight of 20% that the result in compressive strength of the concrete in utilizing waste tire rubber than normal concrete demon started a ductile plastic failure rather than brittle failure finally conclude replacement of coarse aggregate by crumb rubber of to 20% means the construction.

TITLE: Investigated based on partial replacement of coarse aggregate with waste tire rubber in concrete.

AUTHOR: I.Rohini, V.Arularasi, A.C.Laithamathu

CONTENT: International journal of latest Research in engineering and technology ISSN2454 – 5031 state that effect have be taken to identify by the potential application of waste tire in civil engineering project. M_{20} grade by replacing 10%, 20%, 30% of tire aggregate with coarse aggregate and compacted with regular M_{30} grade concrete. Finally they concluded the rubberized concrete does not reduce the cost and even reduce the environmental impact of concrete itself.

MATERIAL USED

CORASE AGGREGATE: 20mm nominal size are used confirming to IS: 383.

FINE AGGREGATE: Sand confirming with IS:383

CEMENT: M_{20} grade used

WATER: Portable clean water has been used for concrete construction and curing confirming IS:10262

CONVEYOR BELT: The conveyor belt normally used size of

EXPERIMENTAL USED:

In this experimental study, the fundamental properties of the concrete were determined from compressive strength test, soundness test. Cube size of 150 x 150 x 150mm was cast to determine the compressive strength. Splitting strength was measured on cylinder of size 150 x 300mm. The material involved in this experimental work ordinary Portland cement, fine aggregate, coarse aggregate, waste conveyor belts pieces. The waste conveyor belt pieces was determine specific gravity test, crushing strength, abrasion test.

COMPRESSIVE TEST:

The compressive strength cube are clean the mould and apply oil. Fill the concrete in the molud in layers approximately 5cm thick compact each layer with not less than 25 stocks per layer using the tamping rod level the top surface and smoothen it with a trowel. The test specimen are stored in moist air for 24 hours and after the period the specimen are marked and removed from the mould and curing in 7 days and 28 days. The test result of compressive strength at 7^{th} and 28^{th} day with various percentages of waste conveyor belt. Compressive strength increases with increasing percentage of waste conveyor belt. 10% addition of rubber into the concrete shows maximum benefits in compressive strength even 30% gives more strength than the nominal concrete.

SPLIT TENSILE STRENGTH:

The test result of split tensile strength at 7days and 28 days. Tensile strength increases with increasing percentage of waste conveyor belt. 10% addition of waste conveyor belt pieces into the concrete shows maximum benefits in tensile strength. Even 30% gives more strength than the nominal concrete.

SPECIFIC GRAVITY OF CONVEYOR BELT PIECES

SPECIFICATION	TRIAL I	TRIAL II	TRIAL III
Weight of the pyconometer (A)	0.618	0.618	0.618
weight of bottle + Conveyor aggregate (B)	0.905	0.966	1.210
Weight of bottle + Conveyor aggregate + Water (C)	1.533	1.439	1.540
Weight of bottle + Water (D)	1.457	1.306	1.306
G = [(B-A)/()B-A –(C-D)]	1.360	1.618	1.653

Result of average specific gravity of waste conveyor belt =1.54

CRUSHING STRENGTH TEST ON WASTE CONVEYOR BELT AGGREGATE

OBSERVATION	SAMPLE 1	SAMPLE 2
Weight of the empty mould M1	14.45	14.45
Weight of the mould + aggregate M2	17.476	17.6
Total value of the aggregate (M3 = M2 -	3.025	3.15

Weight of the material retained in 2.36mm sieve	0	0
Weight of the material passed M5	0.814	0.87
Impact value (M5/M3)	26.9	27.7

TABLE 2

Average crushing value of the conveyor aggregate is 27.3% as per IS 383 the crushing value shall not exceed 45% for normal concrete.

ABRACTION TEST ON WASTE CINVEYOR BELT PICECS

DETAILS OF SAMPLE	TRIAL I
Weight of the sample W1 gm	1.5
Weight of the sample after abrasion W2 gm	0.007
Percentage of wear = [(W1-W2)/W3]x 100	99.5%

TABLE 3

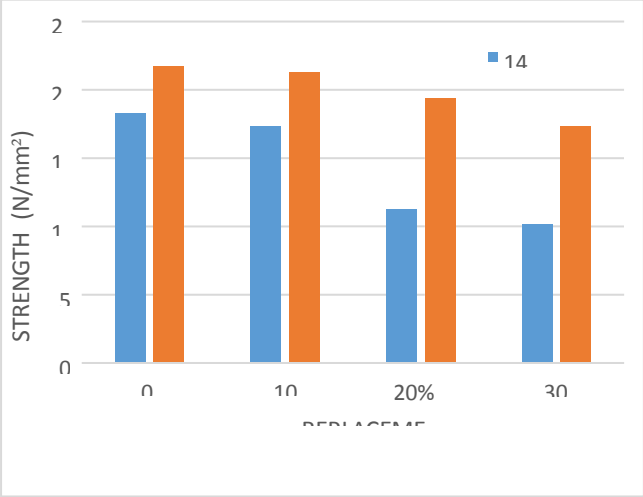
Average value of los angle abrasion is 99.5% and the loss percentage is 0.46%

COMPRESSIVE STRENGTH ON CONVEYOR BELT CONCRETE

Item	No of days	Cube1 (N/mm^2)	Cube2 (N/mm^2)	Cube3 (N/mm^2)	Average (N/mm^2)
10%WCB	14days	17	18	17	17.3
10%WCB	28 days	21.2	20.51	22	21.23
20%WCB	14 days	11	11.24	11.5	11.24
20%WCB	28 days	19	19	20	19.33
30%WCB	14 days	10	10.38	10	10.12
30%WCB	28days	17.5	17.24	17.2	17.31

COMPRESSVE STRENGTH ON CONVENTIONAL CONCRETE

NO OF DAYS	CUBE 1(N/MM^2)	CUBE 2(N/MM^2)	CUBE 3(N/MM^2)	AVERAGE(N/MM^2)
14days	18.5	18.34	18	18.28
28days	21	22	22	21.67



SPILT TENSILE STRENGTH TEST ON REPLACEMENT OF CONVEYOR BELT CONCRETE

S.NO	GRADE OF CONCRETE		ITEM	STRENGTH ON DAYS
1	M_{20}	0%	18	24.5
2	M_{20}	10%	12	20.3
3	M_{20}	20%	9	16.6
4	M_{20}	30%	7	14.8

CONCLUSION

In this analysis comparative of conventional concrete by partially replacement of coarse aggregate by waste conveyor belt comparatively higher than values specified in IS for conventional concrete. we have concluded this result by comparing with the conventional concrete. We have attained the compressive strength of concrete by using waste conveyor belt for 10% as 49.67 N/mm^2, 20% as 41.66N/mm^2,30% as 30.33$N/mm^2$and 10% as 46.67N/mm^2,20% as 38.34N/mm^2,30% as 23.67N/mm^2 at respective days of 14 days and 28 days.

From this present study it has been concluded that maximum strength is obtained by 10% replacement of coarse aggregate eve 30% replacement of coarse aggregate give strength then the normal concrete.

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