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Environment Friendly Concrete by Replacement of Coarse Aggregates by waste CD's

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Abstract- **A large amount of natural and E-waste (coconut shell ,jute ,CDs) is produced in our day to day life and their disposal has become an major environmental concern that need to be addressed wisely. Therefore now the addition of recycled material into concrete is increasingly attracting the attention of civil engineers worldwide. In this project we will replace the coarse aggregates with compact disc shreds. We will study the changes in the properties of concrete and compare this results of experiments with conventional concrete. The result of this work would form basic information for recycling the waste compact discs (WCDs) in concrete mixes and indicate a potential alternative for diminution of the adverse effects on the environment posed by this type of hazardous waste material.**

Keyword-Recycled, Compact Discs, Waste Materials, Concrete

I. INTRODUCTION

A research effort has been done to match society's need for safe and economic disposal of waste materials. The use of waste materials saves natural resources and dumping spaces, and helps to maintain a clean environment. The current concrete construction practice is thought unsustainable because, not only it is consuming enormous quantities of stone, sand and drinking water, but also two billion tons a year of Portland cement, which releases green-house gases leading to global warming. Experiments has been conducted for waste materials like- rubber tyre, e-waste, coconut shell, blast furnace slag, waste plastic, demolished concrete constituents, waste water etc. Construction waste recycle plants are now installed in various countries but they are partly solution to the waste problems. The possibility of a complete depletion of aggregate resources has rendered continued use of aggregates for construction unsustainable.

In view of this challenge, researchers throughout the world have been investigating ways of replacing aggregates to make construction sustainable and less expensive. Research addressing environmental and sustainability issues in construction has generated lot of interest in the world. While wastes generated by industrial processes have created disposal and management problems which pose serious challenges to efforts towards environmental conservation, environmental protection and the reduction of construction costs. Since waste materials can be obtained at little or no cost, while making significant contribution to the conservation of natural resources and maintenance of ecological balance.

II. OBJECTIVE OF THE PROJECT

In our country with increasing rate of rapid technologies construction process are growing fast but on the other hand due to lack of money people in poverty margin are not able to pay more cost for the constructions. To overcome this situation, solution is to minimize construction cost and to maximize strength, durability of material used. This project comes under low cost housing people under this margin are not able to pay this cost for entire construction. There are some schemes like Pradhan Mantri Awas Yojana. The Mission will be implemented during 2015-2022 and will provide central assistance to Urban Local Bodies (ULBs) and other implementing agencies through States/UTs for- In-situ Rehabilitation of existing slum dwellers using land as a resource through private participation, Credit Linked Subsidy, Affordable Housing in Partnership, Subsidy for Beneficiary-led individual house construction/enhancement.

Such facilities are made available completing construction at low cost. Income is the primary factor –not price and available that determines housing affordability. So that understanding affordable housing challenges requires understanding trends. Housing is often the single biggest expenditure of low and medium income families. Owned house is strong psychology desire for every mankind. This project deals with budget of total construction and material cost. Reducing it as a whole but fulfilling all basic requirements .This one of the solution using shells and locally available materials along with improved skills and technology without sacrificing strength performance and life of structures.

Also such low cost structures can be used in earthquake prone areas. As capital investment is low so that after any damage loss of property is low. Such structures with this material are light in weight so that risk of loss of life is also less after collapse like damages.

- The main objective is to encourage the use of waste products as construction materials in low-cost housing.
- To find economical solution for high cost construction material

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- To prepare light weight concrete by using compact Disc as Fine aggregate
- Compact Disc exhibits more resistance against crushing, impact and abrasion, compared to crushed granite aggregate.
- These studies also paved the way to the recognition of using Compact Disc and fibre as substitute for aggregates in developing concrete hollow blocks.

III. LITERATURE REVIEW

Alavi Nikje and Askarzadeh[1] studied the chemical recycling of waste CDs into bisphenol A (BPA). Received polycarbonate wastes from used optical discs chemically recycled to Bisphenol- A by using water as the solvent, Cloisite 30B nanoclay and sodium hydroxide as the support and catalyst, respectively at convenient, green and ecofriendly conditions. The performances of the support in Bisphenol- A recovery yield were examined in comparison with the unsupported as well as nano-SiO2 and nano-TiO2 supported reactions. The optimum condition by having 90% recovery yield was found at 90 min when the reaction performed at equal waste/solvent ratio, catalyst 1% and nanoclay 2%.Two-necked flask was charged with PC wastes (2.5 gr), water (2.5 gr) and NaOH (1% based on total waste and solvent weights) as the catalyst and C-30B, nano SiO2, nano TiO2 as the solid support (PC/solid support= 100/2) .The reaction mixtures were treated for 90 min at boiling points of reaction media. All reaction sets were denoted in Tables 1 and 2. After completion of the reaction, separation and purification of Bisphenol-A was achieved by crystallization in water and further filtration and drying, white BPA crystals were finally obtained characterized structurally and data compared by an authentic sample data.The obtained results from the depolymerisation of PC wastes by using water in combination with sodium hydroxide as the catalyst and nanoclay as the solid support led to successful recovering of BPA at the short reaction times, high yields and eco-friendly condition. This methodology can be added to ecofriendly and green methods for BPA recovering from CDs and VCDs wastes.

Zander et al. [2] investigated new methods to reprocess the excess of plastics in the waste stream including polycarbonate from compact discs (CDs) into nano-fibers as fine as ca. 100 nm in diameter using the electro-spinning technique. New methods are needed to reprocess the excess of plastics in the waste stream. In this work, bottle-grade polyethylene terephthalate (PET), Styrofoam, and polycarbonate from compact discs (CDs) were spun into nanofibers as fine as ca. 100 nm in diameter using the electrospinning technique. The mechanical properties of the fibers were evaluated using microtensile testing. The elastic moduli ranged from 15 to 60 MPa, and displayed stiffnesses comparable or greater than fibers made from commercial polymers of equivalent molecular weight. Nanofibers were also prepared from blends of Styrofoam and recycled polycarbonate. Recycled PET fibers were tested for application in water filtration and had greater than 99% filtration efficiency of 1 μm particles. Nanofibers from both pure and mixed waste streams are expected to have applications in myriad areas such as ultra/microfiltration, composites, and tissue engineering.

Alan W. Biehn [3] studied that more than 200 billion optical discs have been manufactured and distributed worldwide. As electronic storage media evolve, these discs are becoming obsolete. Most unwanted household discs end up in landfills or incinerators. Recycling options for waste discs exist, but public awareness and participation are low. This study examines the possibilities for responsible environmental management of the growing waste stream of optical discs from households around the world. It reviews options for reducing materials used in disc manufacture, models for collection and processing of waste discs, and the differing policies and practices of various countries with respect to e-waste in general and optical discs in particular. The study concludes that environmentally responsible management of optical discs is lacking in all nations, and that optimal implementation of best practices will require the cooperation of governments, corporations, and consumers. It recommends implementation of curbside pickup and corporate mail-in programs for unwanted discs. It also concludes that effective policy-making and process design will require more and better quantitative data about the efficacy of various regulatory models and responsibility structures, and about the environmental impacts of various waste processing and recycling methods.

Zainab Z. Ismail and Ali J. Jaeel [4] first time studied the utilization of waste compact disc shreds(WCDs) in concrete mixture to replace fine aggregate by weight. The influence of partial replacement of WCDs on the fundamental mechanical and strength properties of WCDs-modified concrete mixtures were investigated. He found that compact disc waste can be used successfully to replace conventional fine aggregates in concrete without any long tem effects and with acceptable strength. The compressive, flexural, and tesile strength of all WCDs modified concrete mixtures tend to increase above the values for the conventional concrete mixture.

IV. MATERIALS AND METHODOLOGY

1) Materials

53 Grade Portland cement was used in all types of concrete mixtures. The artificial crushed sand of size less than 4.75mm was used. Natural crushed coarse aggregate of maximum size 20mm was used. The grading of fine and coarse aggregate was confirmed as per IS 383 (1970)[5].

Waste compact disc were collected from college premises. After collection of compact disc they were crushed down to the size of coarse aggregate(10mm-16.5mm) and directly used with different percentages to partially replace coarse aggregate in concrete.

2) Methodology

- Concrete mix design - Mix design for concrete grade M15 was designed as per IS 10262 (2009)[6]. This conventional concrete mixture was free of waste compact disc shredds(WCDs).

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Three types of WCDs-modified concrete were prepared by addition of WCDs to replace the coarse aggregate by 8%, 12%, 17% by weight.

Concrete Mix Design Table:-

	0%	8%	12%	17%
Cement(kg)	3.51	3.51	3.51	3.51
Crushed sand(kg)	11.164	11.164	11.164	11.164
Coarse aggregate(kg)	15.940	14.664	14.027	13.230
Water(kg)	2.038	2.038	2.038	2.038
CD Shredds(kg)	0	1.2752	1.9128	2.7096

(Note:-Given weights are in kg)

- Specimen casting – Concrete cubes of 150 x 150 x 150mm were moulded for calculating the compressive strength. Concrete beam of size 700 x 150 x 150mm were moulded for calculating flexural strength.

V. CONCLUSION

- As per Slump cone test performed we found that workability decreases with addition of WCDs.
- As E-waste is used in concrete it helps to reduce the cost of concrete and thus makes it economical.
- Specific gravity of WCDs being less than coarse aggregate it helps to design light weight concrete.
- This is one of the way to reuse and recycle E-waste by making proper use and recycling, thus optimization of resources can be achieved.
- It helps to reduce environmental pollution and reduces cost as well as disposal problem of E-waste.

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