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Utilization of Demolished Waste for New Construction

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ABSTRACT:

In the present scenario, Recycled aggregates (RA) from construction and demolition waste (CDW) instead of natural aggregates (NA) were analysed in the manufacture of new eco-friendly concrete. Fine (FRA) and coarse (CRA) recycled aggregates were used in different percentages as substitutes of natural sand and gravel, respectively. Demolition of old structures to make way for new and modern ones is common features in metropolitan areas due to rapid urbanization. However very little demolished concrete is recycled or reused. The strict environmental laws and lack of dumping sites in urban areas on one hand are making the disposal of demolition wastes problematic while on the other hand the quarrying of raw materials is becoming difficult. The present work presents the results of experimental investigations carried out to evaluate the effect of partial replacement of cement, fine aggregate and coarse aggregate by different parts of demolished wastes on strength and workability of concrete made

These results were achieved by reducing the incorporation of cement, thereby saving production costs and minimizing environmental impact

Keywords: . Construction and demolition waste . Recycled aggregate .

INTRODUCTION

Concrete has been around for many centuries the first known use of a material resembling concrete was found by the Minoan civilization around 2000 BC. During the earlier stages of the Roman Empire around 300 BC, the Romans discovered that mixing a sandy volcanic ash with lime mortar created a hard water resistance substance which we know as concrete. A huge amount of solid waste is generated annually from construction and demolition activities. This has lead to the promotion of waste recycling as a major measure to reduce waste and to mitigate the harmful effects of construction activities on the environment. Among these waste, concrete apportions more than half of the total. The construction industry conspicuous consumer of raw material of many types and thus large material inventories are required to sustain the growth. Among the various raw materials used in construction, aggregates are important components for all the construction activities and the demand in 2007 has seen increase by 5%, to over 21 billion tones the largest being in developing countries like china, India etc. The use of swine manure, animal fat, silica fume, empty palm fruit bunch, citrus peels, fly ash, foundry sand, glass, plastic, carpet, and concrete aggregate in construction is becoming increasingly popular due to the shortage and increasing cost of raw materials. This study presents an initial understanding of the current strengths and weaknesses of the practices intended to support construction industry in developing effect policies regarding uses of waste and recycled materials as construction materials.

India is presently generating construction and demolition (C & D) waste to the tune of 23.75 million tones annually and these figures are likely to double fold in the next 7 years. C & D waste and specifically concrete has been seen as a resource in developed countries. Works on recycling have emphasized that if old concrete has to be used in second generation concrete, the product should adhere to the required compressive strength. This paper deals with the review of the existing literature work for the use of recycled concrete as aggregates in concrete in respect of mainly the compressive strength and proposes and approach for use of recycled concrete aggregate without compromising the strength.

The need for demolition, repairs and renewal of concrete and masonry structures is rising all over the world, more so in the developing countries

LITERATURE REVIEW

1) **Anagha Kalpavalli, Dr. S. M. Naik (2015)** "Use of Demolished Concrete Wastes As Coarse Aggregates in High Strength Concrete Production." It shows that the concrete specimen with the most replacement of recycled aggregate will develop the least strength as compared to lesser replacement ratio concrete. But from the graphs it can be seen that up to 30 % replacement of natural aggregates by recycled aggregates in concrete can be done as the 28 day compressive strength for up to 30% crosses the target strength-(67.0Mpa). Similar conclusions can be drawn from the results of split tensile strength. With the increase in age though the strength gained increases for both natural aggregate concrete and recycled aggregate concrete, the tensile strength developed for recycled aggregate is less than that of natural aggregate concrete at any age. Though the strength developed is less than that of natural aggregate concrete, it still lies within the usable range for structural concrete. The flexure test indicates

a decreasing trend of flexure strength when the percentage of recycled aggregate in concrete is increased. But there is gradual increase in strength with age of concrete but at all age the strength developed is less than that of natural aggregate concrete.

2) **Menka1 , Urmil Yadav (2015)**, , - "use of demolished waste in concrete ". The main objective of the study was to investigate whether RCA can be used as material aggregates for concrete pavement construction. Compressive strength, flexural strength and sulfate resistance of RCA concrete is examined, where it was observed that mixing of RCA cause increased water absorption.

They cheack with the result by conducting compressive and flexural strength cheack.

3) **Vikas Srivastava, Mohd Monish, Raushan Ranjan and P. K. Mehta**- "Demolition waste in concrete ". This paper presents the research on The strength of recycled concrete is marginally affected up to 10% replacement of cement by demolition waste powder. However, with further increase in demolition waste powder content, the strength decreases. Replacement of regular fine aggregate by demolition waste fine aggregate up to 20% is possible without much compromising the strength and workability. Replacement of regular coarse aggregate by demolition waste coarse aggregate up to 30% is possible, without much compromising the strength and workability. M-25 grade recycled concrete can be produced by: replacing 10% of cement with waste powder; replacing 20% of fine aggregate with waste fine aggregate; replacing 30% of coarse aggregate with waste coarse aggregate, one at a time . The replacement of coarse and fine aggregates by demolition waste is more suitable in respect of both strength and workability

4) **Shahiron Shahidana*, Mohamad Azim Mohammad Azmib , Kumanan Kupusamyc Sharifah Salwa Mohd Zukid , Noorwirdawati Alie**, - "Utilizing Construction and Demolition (C&D) Waste as Recycled Aggregates (RA) in Concrete". The optimum strength of various sizes of aggregates in concrete was recorded. This study found that the optimum results for the split tensile test, compressive strength test and water absorption test were obtained for the aggregates measuring 10mm. The aggregate size of 10mm was taken as the optimum result because the highest figures were recorded for the split tensile test and the compressive strength test after a curing period of 28 days. The rate of water absorption was also among the least compared to larger size aggregates.

5) **Avindana John & Dr. Suhil Kumar Mittal , N.K Dhapekar** - "Applicability of Construction and Demolition Waste Concrete in Construction Sector – Review".The survey of this paper tells that the innovative steps to reduce and reeuse likewaste prevention, resuse of recycled waste, precast construction,flexibility in planning.The confidential building measures are rules and regulations, waste management, commercial, technical, benefit and incentives and conclusion.Looking at all embracing advancements and expectations there is huge curtailments of aggregates from accustomed source

6) **M. Anjaneyulu Naik , A. Ramakrishnaiah** , - "An experimental study on utilization of demolished concrete waste for new construction" In this paper t the possibility of using recycled aggregates as the replacement of natural coarse aggregates or fine aggregates in concrete. A series of tests were carried out to determine the density, compressive strength, split tensile strength, flexural strength and modulus of elasticity of concrete with and without recycled aggregates. Natural coarse aggregates in concrete was replaced with 0%, 20%, 40%, 60%, 80% and 100% of crushed concrete aggregates. Natural fine aggregate in concrete was replaced with 0%, 20%, 40%, 60%, 80% and 100% of crushed brick aggregates. Recycled concrete aggregate can be used as base and sub base materials, in place of crushed stone aggregate, for supporting a concrete pavement system.

7) **Jeyanth Baskaran et al 2020** - Feasibility of Construction Demolition waste in Concrete as a Coarse Aggregate,. This study reveals the feasibility of using cultivated aggregates for the sustainability of natural aggregates. The physical properties of cultivated aggregates were tested and compared with the conventional aggregates. Both Natural Sand and C-Sand are conforming to the Zone II and the sieve analysis results an almost similar pattern of % passing through each sieve. The workability of the CDWC was not affected by the partial replacement of the cultivated aggregate up to 50%. The strength of the CDWC was evaluated by comparing the conventional concrete mix with different mixes of CDWC. The test result clearly shows that M3 mix which was obtained by using 50 % of cultivated aggregates yields a better compressive and tensile strength. Even there is slight reduction in the strength compared to Conventional Concrete it does not have an adverse effect.

8) **Manuel Contreras Llanes & Maximina Romero Pérez & Manuel Jesús Gázquez González4 & Juan Pedro Bolívar Raya**- "Construction and demolition waste as recycled aggregate for environmentally friendly concrete paving" In this paper the use of recycled aggregates in the manufacture of concrete paving blocks was analysed. Thus, the variability in the composition, the lower density and the higher water absorption of CDW are aspects to be borne in mind. In this sense, the addition of FRA and CRA increases the water absorption (WA) and the apparent porosity (AP) of concrete, reducing both its density and resistance (compressive strength (σ) and tensile splitting strength (T)). Additions of up to 50 wt.% of fine (50-0-7) or coarse (0-50-7) recycled aggregates or the substitution of 25 wt.% of each (sample 25-25-7) result in materials with similar properties to the reference materials. Moreover, the results are in accordance with the values established by the EHE-08 for concrete manufacture. Finally, the technological properties of paving blocks manufactured with up to 50 wt.% of RA replacement have a mechanical behaviour similar to the reference material.

CONCLUSION

Concrete recycling will become one of the most important elements for construction sustainability. Concrete in which binders, additives and aggregates are all made of cement or materials of cement, and all of these materials can be used as raw materials of cement after hardening. Concrete which contains waste products as aggregate is called 'Green' concrete. This paper focuses on the feasibility of construction waste aggregate to making new green concrete. Various standard tests were carried out using recycled aggregate such as Based on limited experimental investigation concerning the strength tests i.e.

compression, split tensile and flexural strength . from the above tests it is observed that same or nearer strength is obtained by using demolished concrete as compared to conventional concrete. The test result clearly shows that M3 mix which was obtained by using 50 % of cultivated aggregates yields a better compressive and tensile strength. Even there is slight reduction in the strength compared to Conventional Concrete it does not have an adverse effect.

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