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A REVIEW PAPERON EFFECTIVE REPLACEMENTOF AGGREGATE IN CONCRETE MANUFACTURING PROCESS

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ABSTRACT

Replacement of coarse aggregate by waste material intends to conservation of environment and endurable development.Recycled coarse aggregates gain by crushed concrete was used for concrete production. There are three materials-Demolition waste, rubber flap, coconut shells. Which are used as coarse aggregate in different proportion and repercussion on compressive strength, flexural strength and split tensile strength is studied. Result shows on increasing mixing proportion of demolish waste cause less reduction of strength of concrete while in case offlap rubber and coconut shell on increasing the mixing proportion, strength of concrete reduces significantly.

Keywords: *Mixture proportioning, Aggregate, Recycled coarse aggregate RCA, Mechanical properties, Rubber flap.*

I. INTRODUCTION

Concrete is a composite material which include coarse aggregate, fine aggregate and cement bounded together by using a suitable w/c ratio and harden over time. There is a large demand of concrete in infrastructure development nowadays, for production of concrete continuous voluminous extraction of aggregates from natural resources will lead depletion and ecological imbalance.

Therefore, recycling of waste material has environmental improvement of decreasing the burning up of natural resources and to reduce volume of dumped waste. To achieve good quality concrete using recycled aggregate it is requiredto follow the minimum requirement defined by BCSJ, RILEM, DIN 4226.100.In case of recycled aggregate concrete it will be necessaryto add more cement in concrete made with 100% of recycledaggregate in order to achieve the same workability andcompression strength as nominal concrete. The useof different qualities of recycled aggregate in concreteproduction brings about enhance in the compressivestrength variation

coefficient. Any change in concreteproduction or in the characteristics of the constituents usedproduces a difference of strength in the ensuing concrete.

If tire flap are reused as a construction material instead of being burnt, the unique properties of tire flapcan once again be exploited in a favorable manner. In this perspective, the use of tire flap chips in lightweightconcrete is considered potentially considerable possibilities. Thus, the use of scrap tire flaps in concreteproduction is a necessity than a desire. The use of scrap tires flaps in concrete is anidea applied widely over the world. The use of scrap tire flap rubber in normal strength concrete is a new dimension in concrete mix design and if applied on a large scale would revolutionize the construction industry, by economizing the construction cost and increasing the worn out tire flap disposal.

II. MATERIAL REQUIRED

In this study three different materials are used as recycled coarse aggregate i.e. Rubble obtained from demolished structures, rubber flap (tire flap), and coconut shells.

1. Construction and demolition waste

The recycled aggregates used to produce the concrete were taken from construction and demolition waste. They were prepared by crushing waste concrete by an impact crusher. The proportion of recycled aggregates identified by visual inspection were defined as 92.1% crushed concrete (49.1% of original aggregate plus adhered mortar and 43% of original aggregates), 1.6% of ceramic aggregates and 5.3% of Bituminous and 0.8%of other. Recycled and natural coarse aggregates, named RA and A respectively, had the same fraction size, 4/10 mm (1) 10/16 mm (2) and 16/25 mm (3). Aggregates sieve distribution is carried out in accordance with code UNE-EN 933-1, 2.

RA is different from natural aggregate (NA) as it is composed by two different materials: NA and old cement mortar adhere. Adhered cement mortar is the source of the poor properties of RA: lower density, higher absorption, and higher Los Angeles abrasion. RA is also highly heterogeneous and porous, RA has high amount of impurities. The heterogeneity affects the characteristics of RA and these aggregate properties have a negative influence on recycled aggregate concrete (RAC) quality such as reduction of the compressive strength, tensile strength due to the increased concrete porosity and a weak aggregate–matrix interfacial bond. Although concrete strength decreases when RA is used and the strength reduction could be as low as 40%. The compressive strength of RAC can be improved to equal or exceed that of natural aggregate concrete (NAC) by adding mineral admixtures.

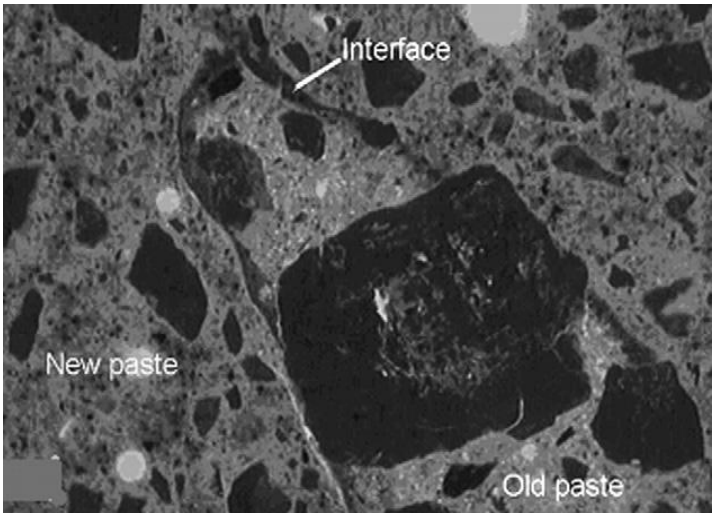

Fig. 1:Interface of recycled aggregate

2. Coconut shell

Coconut shell is utilizing as coarse aggregate as partial replacement of conventional coarse aggregates. Its utilization is sustainable approach to consume the non-biodegradable coconut shell waste.

Fig. 2: Coconut shell

3. Rubber flap

The replacement of coarse aggregate by scrap flap rubber effects on the workability and strength of the Concrete. The size of coarse aggregate is less than 10mm. As with fine aggregate, for increased workability and economy as reflected by the use of less cement, the flap rubber should be rinsed in the water and it should be

dried.recycledtyre rubber is used to develop deliberately low elastic modulus and highly ductile ECC repair material so as to alleviate repair failure induced by restrained drying shrinkage.

Fig. 3: Tire flap

III. LITERATURE REVIEW

1. **E. Vázquez et al.**According to this study it is found that RCA with adhered mortar lower thestrength so to produce RCA without mortar impact crusher can be used.Medium compression strength concrete made with 25% of recycled coarse aggregates attain the same mechanical properties as that of nominal concrete employing the same quantity of cement and the equal effective w/c ratioand concrete made with 50% or 100% of RCA needs 4–10% lower effective w/c ratio and 5–10% more cement than conventional concrete to attain the same compression strength in 28 days. The modulus of elasticity is lower than that of conventional concrete. However, the tensile strength of RCA can be higher than that of conventional concrete (concrete made by raw aggregates).

2. **Luís Evangelista et al.** In this study to keep the slump constant of fresh concrete it is required to increase the effective w/c ratio of some of the mixes as the replacement ratio of normal aggregate with recycled aggregate increases.

3. **Darshan M K et al.** In the study of replacement of aggregate with coconut shells they conclude that Crushing and impact value of shells is very less when compared to coarse aggregates so it cannot be used in heavy works. If the strength has to be increased, addition of fiber and admixture is required which makes it uneconomical. Increase in percentage replacement by coconut shell reduces

compressive strength of concrete. It is because proper bonding between coconut shell and cement is not possible because of surface area of coconut shell aggregate.

4. **M Lenin Sundaret al.** Their test study indicates that there is great potential for the utilization of waste tyres inconcrete mixes indifferent percentages, from 10 to 40 percent. From this present study it has beenconcluded that maximum strength is obtained by 10% replacement of coarse aggregate even 40 percent of replacement of coarse aggregate give more strength than the nominal concrete. Concrete with higher percentage of flap rubber possess high toughness from the present experimental study, Rubberized concrete strength maybe improved by improving the bond properties of rubber aggregate.

IV. CONCLUSION

There are following conclusion can be drawn from this study.

- This study showed that natural aggregate can be substitute by recycled aggregate on a large extent at lower cost. Recycled aggregate concrete gives same compressive strength as nominal concrete up to a defined proportion of RA. If proportion of RA increased more than 40% it shows significant reduction in strength of concrete.
- It is also conclude that coconut shell do not shows enough compressive strength so it is also conclude that coconut shell cannot make proper bond with cement mortarso it can not be used in heavy works.
- Use of rubber flap as an aggregate in concrete shows maximum strength at 10% to 40% replacement even more than nominal concrete strength.

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