PROJECT REPORT

ON

PERFORMANCE RELATED APPROACH ON THE USE OF RECYCLED CONCRETE AGGREGATES IN SCC WITH EMPHASIS ON SUSTAINABILITY

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IN

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ABSTRACT

The term SCC refers to a new special type of Concrete mix, which is able to flow under its own weight, completely filling formwork and achieving full compaction, even in the presence of congested reinforcement without any segregation. SCC generally possesses a higher powder content which keeps concrete cohesive with high flowability. A substantial part of this powder could contain fillers like fly ash, crushed rock fines, silica fumes etc. Volume of coarse aggregates, paste, powder, dosage of superplasticizer and mixing methods play an important role in the flowability and other requirements of SCC.

The use of recycled aggregates in concrete opens a whole new range of possibilities in the reuse of materials in the building industry. The utilization of recycled aggregates is a good solution to the problems of excess waste materials, provided the desired quality of product is reached. Recycling of rejected building materials is a very important issue for saving energy, resources and for environmental protection.

The use of recycled aggregates gain importance when it is used in SCC, since the advantages of SCC and use of recycled aggregates leads to higher performance of concrete compared to normal concrete and also is environment friendly.

In this study, cement (OPC 53 grade), fly ash, commercially available polycarboxylic acid superplasticizer, natural sand, crushed angular normal aggregates and recycled aggregates of maximum size 20mm were used. The mix proportioning method for developing SCC is based on the absolute volume concept starting with the volume of paste . The method involves very few trials for obtaining SCC which can be advantageously used in field practices.

Eighteen SCC mixes were designed using cement contents ranging from 300 kg/m^3 to 450 kg/m^3 and two water contents, 170 l/m^3 and 190 l/m^3. The volume fractions of paste were 0.38, 0.40, and 0.42. The powder content varied from 490 - 670 kg/m^3. The water to powder ratio ranges from 0.25-0.38. The water to cement ratio ranges from 0.38-0.63. Fresh properties of SCC were assessed using slump flow test for flowing ability, J-ring test for passing ability and Column Segregation test for segregation resistance. Cubes of 100mm were casted for compressive strengths at 7 and 28 days. Cylinders of 100mm diameter were casted for tensile strength. Also discs of 100mm diameter were casted for sorptivity tests.

The findings of the study indicate that with the range of volume of paste of chosen, SCC can be developed for recycled aggregates. The higher paste content makes the mix cohesive and the flowing ability is increased and the compressive strength also increases.

Sorptivity test conducted in the study shows that SCC using RCA is durable. it is observed that the sorptivity of SCC using recycled aggregates is found to be better than the sorptivity for normal concrete using natural aggregates.
It is also observed that the sorptivity of SCC using recycled aggregates is in par with the sorptivity of SCC using natural aggregates.