STRENGTHENING THE SELF COMPACTING CONCRETE BY RECYCLED AGGREGATE

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Abstract

Concrete is the second-most-used substance after water, and more than six billion tonnes of cement are produced each year. As part of the current investigation for new innovations in concrete as well as to decrease aggregate waste, an experimental assessment on self-compacting concrete with varied percentages of coarse recycled concrete aggregate was conducted. The major objective was to investigate the use and effects of coarse recycled aggregate in next generation concretes. The environment is under a great deal of stress as a result of the considerable increase in trash produced during construction and demolition over the past few years, together with the rise in demand for building materials.As a result, the use of recycled aggregate in concrete has been encouraged, which not only enables a more efficient use of natural resources throughout their life cycles but also contributes to environmental protection. This study employs coarse recycled aggregate (RCA) in varying percentage replacements of natural coarse aggregate (NCA) from 0 percent to 100 percent with increments of 20 percent for the production of self-compacting concrete (SCC) of grade 40. Super-plasticizer is applied in order to achieve SCC flow properties at a dose dependent on cement weight. At 28, 56, and 90 days old, testing for split tension and compressive strength were performed on the animals. It has been shown that up to 40% recycled aggregate may be used to create SCC without noticeably decreasing strength and durability.

***Key words**: Recycled aggregate Self- compacting concrete, super plasticizer*

1.0 Introduction

During the past ten years, concrete technology made enormous progress. Concrete is no longer a substance made of cement, aggregate, water, and admixtures; instead, it is a designed material with a few additional components that work well in a variety of settings. Today's concrete incorporates special components like metakaolin, micro silica, and a wide variety of folios, fillers, and pozzolanic compounds and may be completely designed for a variety of uses. The ability for manufacturers and consumers to customise concrete to their specific needs

has increased thanks to the development of choosing a concrete based on its execution needs rather than the components and fixes.

2.0 Objectives

Studying the applicability and impact of coarse recycled aggregate in next generation concretes was the major goal.
1. Split strength and compressive characteristics were taken into account. Seven and 28 days after cure are used to study the strengths.

3.0 MATERIALS

Different ingredients used in this work are Cement, Fine aggregate, Coarse aggregate, Normal coarse aggregate & Recycled coarse aggregate, Water, Super Plasticizer. The properties of cement are presented in Table 1.

Table 1: -Physical properties of cement

S.NO	DESCRIPTION	VALUES
1	Specific Gravity	3.12
2	Fineness of cement	7.13

Table 2:- CHEMICAL COMPOSITION OF CEMENT OF 53GRADE

S.NO	DESCRIPTION	COMPOSITION	PERCENATGES
1	Lime	Cao	60-67%
2	Silica	Sio_2	18-25%
3	Iron oxide	Fe_2o_3	0.5-6%
4	Alumina	Al_2o_3	5-9%

4.0 EXPERIMENTAL INVESTIGATIONS

4.1 Compressive strength results

The cube specimens of 150mm x 150mm x150mmwere cast and tested in compression testing machine for 7 ,28 days of curing period for different proportions of concrete mix and presented in table.

Table 3: -Compressive strength of concrete with recycled aggregates as partial replacement of coarse aggregate in concrete

Sl.no	MIX TYPE	Compressive strength of results.N/mm²		
		28 days	56 days	90 days
1	R0	62.84	68.45	73.19
2	R20	61.09	66.54	71.46
3	R40	59.34	64.56	69.25
4	R60	57.84	63.02	67.30
5	R80	53.86	58.65	62.53
6	R100	52.69	57.29	61.63

4.2 SPLIT TENSILE STRENGTH TEST: -

At the age of 28,56 and 90days, the cylindrical specimens (150mm diameter x 300mm height) were tested for evaluating the split tensile strength. The experiment is performed by putting a cylindrical sample horizontally between a compression-testing machines loading surface and the load is applied until the cylinder fails along the vertical diameter.

Table 4: -Split tensile strength of concrete with recycled aggregates as partial replacement of cement in concrete

Sl.no	MIX TYPE	28 days	56 days	90 days
1	R0	6.10	6.64	7.13
2	R20	5.99	6.52	6.99
3	R40	5.90	6.39	6.87
4	R60	5.77	6.28	6.74
5	R80	5.49	5.98	6.41
6	R100	5.22	5.67	6.10

5. Conclusions

In this study the concrete ingredients like

coarse aggregates are replaced by recycled aggregates Varied with different percentages of 20%,40%,60%,80% and 100%.

1. The Compressive strength of normal concrete at the age of 28,56 and 90 days are 62.84N/mm^2 ,68.45 N/mm^2 and 73.19 N/mm^2.
2. The Split tensile strength of normal concrete at the age of 28,56 and 90 days are 6.10 N/mm^2 ,6.64 N/mm^2 and 7.13 N/mm^2.
3. At 20% partial replacement of coarse aggregate with recycled aggregate the compressive strength of concrete at the age of 28,56 and 90 days are 61.09 N/mm^2 ,66.54 N/mm^2 and 71.46 N/mm^2.
4. At 20% partial replacement of coarse aggregate with recycled aggregate the Split tensile strength of concrete at the age of 28,56 and 90 days are 61.09 N/mm^2 ,66.54 N/mm^2 and 71.46 N/mm^2.
5. The Split tensile strength of normal concrete at the age of 28,56 and 90 days are 5.99 N/mm^2 ,6.52 N/mm^2 and 6.99 N/mm^2.

6. References

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