

DURABILITY CHARACTERISTICS OF RECYCLED AGGREGATE AND WELD SLAG BASED HIGH PERFORMANCE CONCRETE

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ABSTRACT

Recycled aggregate (RA), the environmental rate is low due to insufficient strength and also to ensure that high porosity of the concrete. From the literatures lot of researches to investigated the presence of this recycled aggregate. To overcome this problem using weld slag form the material manufacturing industry, improve their strength of recycled aggregate mixed with (0-100 %) replacement. To avoid the wastages of copper weld slag material and increasing their strength, it is destroyed with a powder shaped material. This investigation replaces with 0%, 10%, 20%, 30% recycled aggregate and cement with weld slag. And tensile strength, compressive strength, flexural test were carried out by the universal testing machine. This result showed that replacement of recycled aggregate and Weld slag compared with the other mixtures. Using weld slag to increased their strength of recycled aggregate for the various mixed ratios. From this experimental work partially recovered the wastages and recycled aggregate in concrete. The reuse of weld slag, conservation of natural resources can be developed and increasing natural resources of environmental losses. Application of Weld slag used in abrasive materials, cutting tool, and roofing granules.

Keywords: Recycled aggregate, copper slag.

I.INTRODUCTION

Recycling and reusing the wastages to increasing household system in UK. This system of 40 % wastage recycled and increasing their infrastructure. The recycled aggregate used in the low and high grade applications based on their strength characteristics respectively. Some of the high grade applications of various miss proposed mixture totally avoided [1]. The replacements of concrete such as metal, glass and various aggregates etc [2]. Where used to reduce the rate of resources in landfill areas. Similarly 80 millions wastages are recycled by the Netherland Company [3]. Generally slag's are produced large amount of metallurgical of good bonding with their neighborhood element. Land fill usages to create a air , water pollution and affect the natural resources such as soil and ground water illustrative [4] . Some of the bio-degradable such as slag cannot be used and storage capacity is less and effects of this slag raise the lot of environmental problems. Handling this slag of un avoiding material to failed in Oxide layer formation [5]. Similarly the slag fluxes also the creating lot of the environmental problems.

In this investigation based on the mixed recycled aggregate and demands for extension of recycled concrete and enhanced with the current obstacles. And the porous nature reduced the strength.. For normal mixing approach the recycled aggregate tested by the several strength test experiments.

A.WELDSLAG AND RECYCLED AGGREGATE

Weld slag consists of a fine grain structure illustrative to the good physical properties. Weld slag obtained from weld industry were used. Recycled aggregate obtained from demolished building of size 16mm was used .

II.EXPERIMENTAL SETUP

This experimental investigation addition of aggregate percentage ratios, 0%, 10%, 20 % and 30 % respectively and normal mixing approach. Hong Kong Special Administrative Region [9] studied with 1:1.8:1.8:0.9 (ordinary Portland cement/fine aggregate/20 mm coarse aggregate/10 mm coarse aggregate) with water/cement ratio of 0.45 and grading requirements according to BS 882 [10]. The cube sizes 100X100X100mm,150mm dia and 300mm height,100x100x500mm size are used in the experimental testing for the tensile and compressive, flexural test. This mixed design compared with the base material and proportions. The test carried out by the number of days (7, 28 and 365) , according to BS 1881: Part 116 [7] and BS 1881: Part 118 [8] for compressive and flexural strength respectively. The recycled loading examined in this investigation to measured the water absorption density, compressive strength, tensile strength and flexural strength and modulus of elasticity.

The replacement of fine aggregate environmentally beneficial current legislation and experience. However recycling aggregate demolished with concrete. These technical problems, include weak interfacial transition zones between cement paste and aggregate, porosity and traverse cracks within demolished concrete, high level of sulphate and chloride contents, impurity, cement remains, poor grading, high variations in quality, which render the use of RA for structural applications difficult [9,10].

III.RESULTS AND DISCUSSIONS

A. TENSILE TEST

The tensile test was carried out by the universal testing machine. These testing machine both facilities by the tension and compression. This machine will processed according to the IS 5816 guidelines. The compression ratio -1 to 1 applied a load gradually for an equal attitude. The tensile strength of various proportions compared with their recycled aggregate content. Using the proportions 0%, 10%, 20% and 30 %.From the tensile test the strength gradually increased for the precipitation of other aggregate mixtures. After the 20 % the high grade applications the strength will decrease gradually.

B.COMPRESSIVE STRENGTH

Compressive strength and tensile test carried out by the 7, 14, 28 days. According to the guidelines the specimen will break under the 2000 kN. Further deformation value very closer to the various proportions such as 0% to 10%. By adding Weld slag 10% increased due to the cement properties respectively. Similarly the reinforcement of Other proportions the effect of cement particles to increase their strength. 20% to reach the highest value of tensile strength.

C. FLEXURAL STRENGTH

The flexural strength where as 80 kN applied at a constant rate 150 kg /min as per the IS 516 guidelines. The strength increased gradually for the replacement of recycled aggregate with the 10 % and 20% comparatively. Here 30% replacement has high flexural strength.

D.SEM ANALYSIS

Using Scanning Electron Microscope, the missed design of 0%, 10%, 20% and 30% microstructure shown in figure 1 and 2 . After the recycled aggregate, good bonding with high amount of reinforcement concrete normal mixing approach. The low amount of porosity accord due to the refinement grain structure. The oxide layer formation is low .this standard analysis followed by the GI 586 guidelines. The magnification factor X200 pixel for the SEM analysis. The chemical commotion demolishing less amount of oxide layer formation Due equal axed various chemical component.

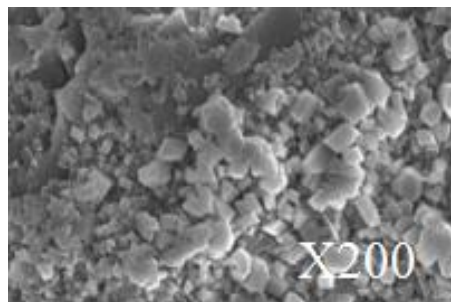


Figure 1. Porous zones

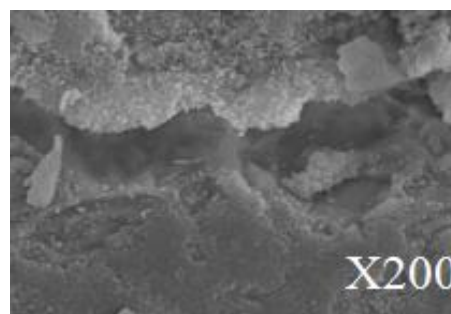


Figure 2. Interior zones with RA

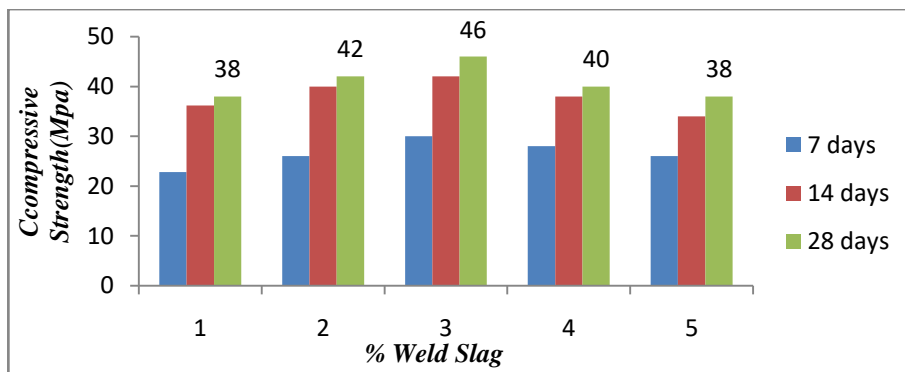


Figure 1. Compressive strength(0%, 10%, 20%, 30%)

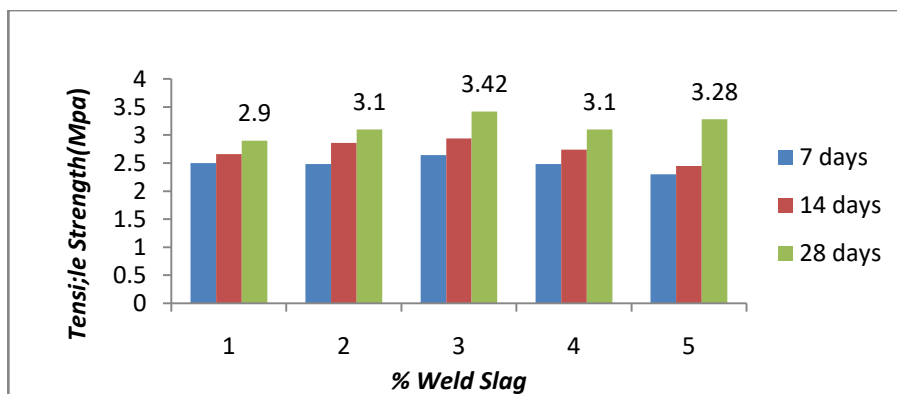


Figure 2. Compressive strength(0%, 10%, 20%, 30%)

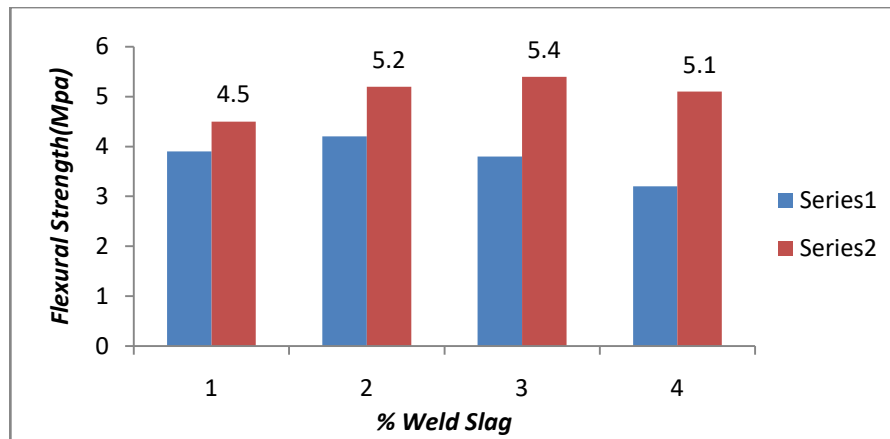


Figure 3 Flexural strength(0%, 10%, 20%, 30%)

IV.CONCLUSIONS

- ✓ From the test results has good strength compared with the other aggregate concrete. These properties of material good relative to the experimental analysis.
- ✓ By adding Weld slag on concrete good bonding with the recycled aggregate used in the low level applications.
- ✓ The highest strength occurred In 20% of replacement concrete with recycled aggregate.
- ✓ In future use the result and store avoiding the environmental defets.
- ✓ Weld slag after the weld slag cooled by the water increasing their strength. Yield strength
- ✓ The limit extent of recycled aggregate and Weld slag to increase weight for highest adding percentages.
- ✓ In this investigation optimum parameter 20% and 30% attain the maximum tensile strength and compressive strength.
- ✓ The replacement of Weld slag and recycled aggregate very effectively and to overcome the wastage drawbacks.

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