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Durability of Concrete Made From Blended Cement

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ABSTRACT -This research work involves the topic of adding blended material to the concrete to study the strength properties and observe difference between both materials. Basically, there are four types of blended materials like Slag cement,Fly ash,Lime Stone,Silica Fume. Blended materials are studied as construction materials by different researchers and can be used in cement, mortar or concrete in building materials. This research work may include the characteristics of blended material, its properties and also compatibility of cement and compares its nature of concrete and concrete with blended material. But it also to compare and draw the conclusion of the proportion of different material cement. This study summarizes the comparison and difference between opcconcrete and concrete with blended material.

Key Words: Blended Material, Slag cement,Lime Stone, Silica Fume,Fly ash, Opc cement.

I. INTRODUCTION TO BLENDED MATERIAL

Blended material is the most commonly used construction where special characteristics required. Blended is a strong durable material obtained from the natural resources. Blended materials are providing different characteristics to the structures where all necessity parameters are required.

1.1 PROPERTIES OF BLENDED MATERIAL

The actual content of the material elements is about 30% of the weight of the mixing. Improve durability , Increase strength, reduce permeability, improve resistance to chemicalattack,Using for reducing the mixing water requirement,Increases the porosity of cement-basedmaterials due to dilution effect,Increase strength and durabilityand improving the paste flow behaviorgreaterworkability, More consistent performance.

In order to obtain a superior quality structure and good sustainability, it is preferable to use blended materials to develop several strength characteristics of the structure. Different materials of blended were tested for its adequacy for the addition in concrete. Different qualities are getting by based on their mixing proportions with cement.

1.2 CHARACTERISTICS OF BLENDED MATERIAL

Blended material is the hardest substancematerials like concretematerial. It contains hardness about 50% in the material. With , this material also consists of strength,reduce permeability,Greaterworkability, durability etc. the properties of this material are greatly affected by its chemical composition. In blendedmaterials like Slag cementandSilica Fume, Slag cement is the strongest organic constituent that imparts material stability, stiffness and strength. Hence, we can say that blended material is a one of the strongest materials. All the materials are have different aim to use with their requirements for unique structures. Over the period of time structures manages stability , durability against extreme weather conditions.

1.3 NEED OF STUDY

The application of concrete as a strengthening material in structural is somewhat limited by the disadvantage such as poor ductility and durability, fatigue, lower impact resistance, low tensile strength, brittleness. It is also very much restricted to absorb dynamic stresses caused due to shock loading. Affected by chemical products that might be possible overthe period of time concrete structures gets lowerstrengthen, lower durability. Lower tensile strength and higher strength requirements of the concrete is the main problems of steel and these problems are still existed, and will be improved through different types of reinforcement material. Blednded material

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are mainly have characteristic for durability, ductility ,provides against different weather conditions. In that blended material increasing the content will increase the strength and decrease compressive , and plastic shrinkage by limiting the crack-expansion.

1.4 SCOPE

The main aim of this research work is to conclude whetherblended materials has satisfactory changes properties thatit can be use as a construction material and also todetermine areas of further study.The properties to be studied are durability, compressivestrength, split tensile strength , low maintenance by adding ofthe blended cement in normal cement.

The main objective is to study the effect on utilization ofblended cement in the concrete and in this investigationthe blended materials that using slag cement for durabilityis mixed in different proportions. To study the blended material with opc cement underdifferent conditions.To prepare concrete from the blended cement vs opccement to study durability properties.

II. RESULTS AND DISCUSSION

2.1 Compression Strength Test

The compression strength (cube strength) of concrete is that the strength of hardened concrete measured by the compression test. For testing at a single time 3 specimens were tested under ACTM (Accelerated Corrosion Testing Method) and average value of 3 specimen was taken as a final result. Concrete compression test was performed according IS 516-1959. Testing for compression strength was executed at 7, 28, 54, and 92 days age of curing.

The compression strength of each sample tested after 7, 28, 54 and 92 days of curing period. The average of three samples is taken as the compressive strength. The results of average compressive strength and also the percentage change in compressive strength with material reinforced concrete and normal concrete.

Table -1: Result of Compressive strength test

Compressive Strength results without material				**Compressive Strength result with blended material(Slag cement)**		
Age	Specimen 1	Specimen 2	Specimen 3	Specimen 1	Specimen 2	Specimen 3
(Days)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)
7	16.10	16.31	16.24	17.32	17.05	17.33
28	24.38	23.89	24.54	26.60	26.53	26.21
54	26.80	26.91	27.10	29.89	30.71	30.43
92	29.94	29.44	29.73	35.53	35.90	35.55

Table -2: Average values of Compression strength

Average Compression Strength Test			
Age	Without material	With material	% Increase
(Days)	(N/mm^2)	(N/mm^2)	
7	16.67	17.23	3.5%
28	24.60	26.44	7.4%
54	26.60	29.68	9.7%
92	29.70	35.66	16.9%

From table-2, we can say that the blended material showsimprovement in compression strength when compares to normal concrete.

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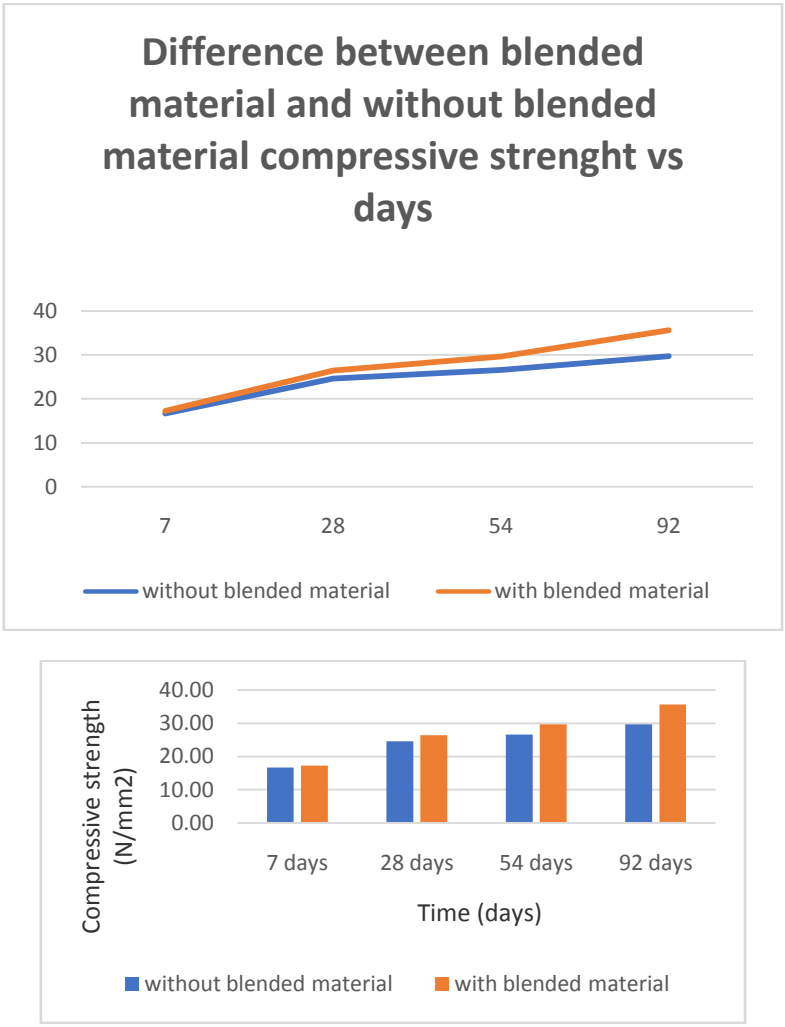

Chart -2: Comparison of compressive strength for both controlled and blended concrete

Chart -2 shows a slight decrease in compressive strength when adding blended materials to the concrete. At the age of 7 days the compressive strength was Increased by 3.5% and this Increase with the time of curing. After that the difference of compressive strength between concrete with blended material and without blended material changes with the increase of curing period. As show in chart-2 the compressive strength of blended concrete after 54 days Increase the compressive strength was 9.7 % and after 92 days Increase in the compressive strength was 16.9%. Therefore, based on the results, Blended material concrete is suitable for compressive strength.

2.2 Split Tensile Strength Test

Split tensile strength test were performed according to IS-5816:1999. Split tensile strength test was performed at 7, 28, 56 and 90days age of curing. Split tensile strength samples were tested at UTM (universal testing machine) with an average of 3 as the final results.

In this test performing cylinder by curing days as 7,28,54,92. The result of test performed is given in the tabular form below. The split tensile strength of each specimen of sample tested after the curing period of 7. 28, 54 and 92 days. The average of the three specimens is taken as the split tensile strength of concrete sample. The average split tensile strength and also the percentage change in split tensile strength with blended material concrete and normal concrete.

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Table 3: Result of split tensile strength test

Split tensile Strength results without blended material				**Split tensile Strength result withblended material**		
Age	Specimen 1	Specimen 2	Specimen 3	Specimen 1	Specimen 2	Specimen 3
(Days)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)
7	1.91	1.89	1.85	2.05	2.10	2.07
28	2.20	2.15	2.14	2.45	2.40	2.35
54	2.76	2.80	2.78	2.95	2.99	2.97
92	2.90	2.95	2.97	3.19	3.25	3.35

Table 4: Average values of split tensile strength

Average Split tensile Strength			
Age	Without blended material	With blendedmaterial	% Increase
(Days)	(N/mm^2)	(N/mm^2)	
7	1.88	2.05	7.5%
28	2.16	2.41	8.1%
56	2.78	2.97	8.5%
92	2.94	3.26	10.5%

The results in table 4 is specific that the Split tensile strength is improved significantly with blended material. The percentage increments in Split tensile strength with blended material are 7.5%, 8.1%, 8.5% and 10.5% at the age of 7, 28, 56, and 92 days respectively. It can be concluded that with increasing age the 1.5% change flexural strength is also Increasing.

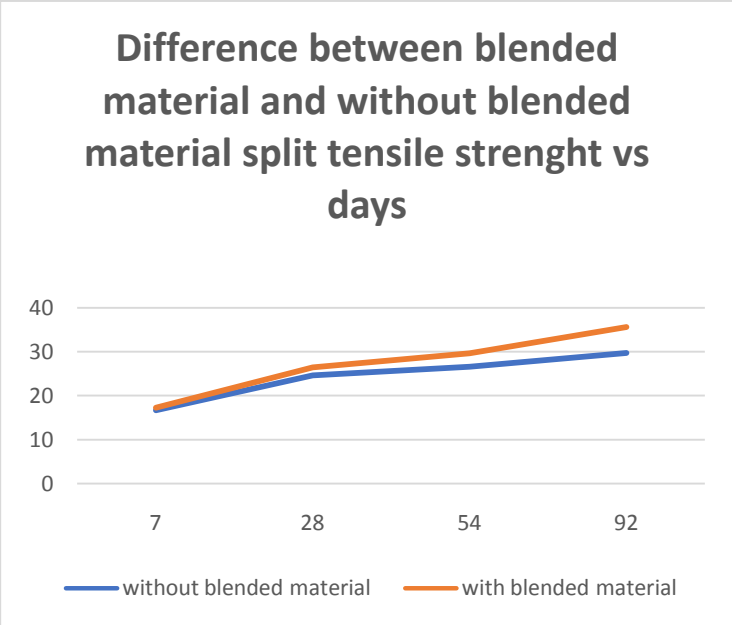

Chart-3: Comparison of Split Tensile strength for both blended and without blended material concrete

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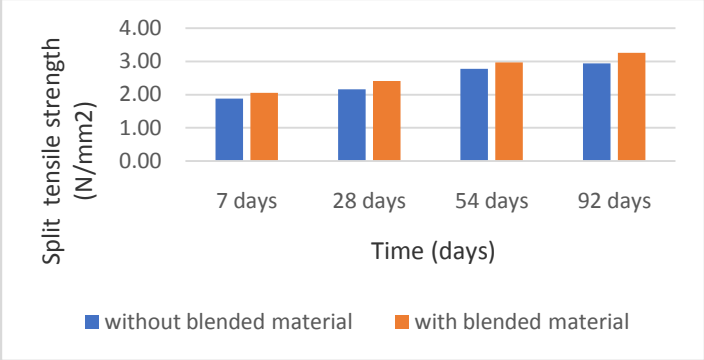

Chart-4: Comparison of Split Tensile strength for both blended and without blended material concrete

Chart-4 shows that the split tensile strength of blended material concrete is significantly improved as compare to normal concrete. The obtained maximum strength improvement was 8.5% at the age of 56 days.

III. CONCLUSIONS

The compression strength was Increased with the addition of slag cement (blended material). The compression strength gain at the age 7 days was 3.5%. compare between two materials for structural works by 30% of slag cement it is worth for unique requirements. The percentage increments in split tensile strength with blended material are 7.5%, at the age of 7 respectively. Its concrete is significantlyimproved as compare to normal concrete. The Split tensile strength is improved significantly with slag cement (blended material.) In large structural construction work economical factors are consider for this material.

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