Research Result

Analysis Of Blended Concrete Using Lathe Dust Scrape and Egg Shell Powder

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ABSTRACT

In construction industry concrete is major material used nowadays. Concrete has better resistance in compression while steel has more resistance in tension. Conventional concrete has limited ductility, low impact and abrasion resistance and little resistance to cracking. To improve the pre cracking and post cracking behavior of short discontinuous and discrete fibers are added to the plain concrete to make it fibrous concrete. The egg shells ash contributing 2.5% and 7.5% percentage were used in concrete mixes by volume of cement and lathe dust (scrap) of various proportions i.e., ranging from 1%, 3%, 5% and 7% as additives for each of the concrete mixes of M25 grade as per IS code method of mix design. Super plasticizer was also used in all mixes to make concrete better in workability. Besides cubes of M25 grade concrete were cast 2.5% and 7.5% egg shells ash and different percentages of lathe dust respectively, by volume of cement and identifies its combinations that demonstrate maximum compressive strength of concrete.

KEYWORDS

Conventional concrete, strength –properties, egg shells ash, scrap, lathe dust, industrial waste

1. INTRODUCTION

The infrastructure needs of our country is increasing day by day and with concrete is a main constituent of construction material in a significant portion of this infra-structural system, it is necessary to enhance its characteristics by means of strength and durability. Concrete is a relatively brittle material. Addition of fibers to concrete makes it a more ductile material. Plain cement concrete has some shortcomings like low tensile, limited ductility, little resistance to cracking, high brittleness poor toughness. The cracks generally develop with time and stress to penetrate the concrete, thereby impairing the waterproofing properties and exposing the interior of the concrete to the destructive substances containing moisture, bromine, acid sulfate, etc. The exposure acts to deteriorate the concrete, with the reinforcing steel corrosion. To counteract the cracks, a fighting strategy has come into use, which mixes the concrete with the addition of discrete fibers. Experimental studies have shown that fibers improve the mechanical properties of concrete such as flexural strength, compressive strength, tensile strength, creep behavior, impact resistance and toughness. Among them, polymer fibers and the steel fibers enjoy popularity in the domain of concrete. It is obvious that the behavior of HFRC depends on the aspect ratios, orientations, geometrical shapes, distributions and mechanical properties of fibers in concrete mixtures. from a brittle to a more ductile material.

2. LITERATURE REVIEW

Shrikant Phulari et al (2022) they studied that there is currently a widespread trend to decrease the usage of common resources and recycle garbage. Concrete serves a crucial role and is produced in vast quantities. The objective of this study isto evaluate the qualities of waste eggshell powder (ESP) as a partial replacement for Portland cement in concrete, in addition to the reuse of waste eggshell powder. Eggshell powder is used in numerous mixes, which can be substituted for 0% to 20% of the weight of cement in concrete in 5% increments. The compressive strength, tensile strength at tear, flexural strength test, and durability test are evaluated after 28 days of curing. These are compared to a standard mix containing 0% ESP to identify the optimal replacement material combination. **M.S. Sugirtha1 and K. Sargunan (2019)** they studied that the investigations on cement concrete proportioned with eggshell powder as a substitute mantle for cement. Although, it aims to understand the approaches covered by main research streams in area so as to highlight the advantages and uses of calcium rich material. **Manzoor Ahmad And Suhaib (2018)** they studied that the use of SCM‟s was done from the ancient Greeks who incorporated volcanic ash with hydraulic lime to create a cementitious mortar. The Greeks passed this knowledge on to the Romans, who constructed such engineering marvels as the Roman aqueducts and the Coliseum, which still stand today. Early SCMs consisted of natural, readily available materials such as volcanic ash. **Arun Kumar et al (2018)** they studied that Construction industry depends heavily on conventional materials such as cement, granite and sand for the production of concrete. Cement is the most economical constituents used in the production of concrete and also poses the problem of acute shortage in many areas,

which poses serious problems on its availability, cost and environmental impact.

3. OBJECTIVE OF THE STUDY

The idea behind this study is the utilization of lathe scrap and egg shells powder in improvement in the strength of concrete and use of waste for savior of earth. This study aims to have a comparative study between lathe scrap and egg shells ash concrete at various % replacement with cement and conventional concrete in M25 concrete. The main objective of the study is to investigate the change in characteristics strength properties and workability of concrete mixed with different percentage of fly ash with lathe dust. Following are objectives of the study.

- To find out the effect of lathe dust and egg shells ash on strength when mixed with concrete sample.
- To study the workability of concrete on variation in different material with different percentage of egg shells ash and lathe dust when mixed withconcrete.
- To find out the change in slump value.
- To perform the sieve analysis and specific gravity of aggregate used.

4. METHODOLOGY

Following test were conducted on prepared samples and materials also as per relevant IS code of Practice:

1. Slump Cone Test
2. Compressive Strength Test

SLUMP CONE TEST

This is a test used extensively in site work all over the work. The slump test does not measure the workability of concrete although ACI 116R – 90 describes it as a measure of consistency, but the test is very useful in detecting variations in the uniformity of a mix of given nominal proportions. The slump test is prescribed by IS: 456 (2000), ASTM C 143 90A and BS 1881 Part 102:1983.

COMPRESSIVE STRENGTH TEST

Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material, quality control during production of concrete etc. Test for compressive strength is carried out either on cube or cylinder. Various standard codes recommend concrete cylinder or concrete cube as the standard specimen for the test. Out of many tests applied to the concrete, this is the utmost important which gives an idea about all the characteristics of concrete. By this single test one judge that whether Concreting has been done properly or not.

5. OBSERVATION AND RESULTS

Slump Cone Test

This is a test used extensively in site work all over the work. The slump test is prescribed by IS: 456 (2000), ASTM C 143 90A and BS 1881 Part 102:1983.

Slump Cone Value of M25 Grade of Conventional Concrete With 2.5 % Of Egg Shell Ash and Different % Lathe Dust Scrap

S NO	MIX	EGG SHELL ASH (ESA) (%)	LATHE DUST (LD) (%)	SLUMP VALUE (mm)
1	M1-ESA2.5LD0	0	0	37
2	M2- ESA2.5LD1	2.5	1	37
3	M3- ESA2.5LD3	2.5	3	38
4	M4- ESA2.5LD5	2.5	5	39
5	M5- ESA2.5LD7	2.5	7	42

Slump Cone Value of M25 Grade of Conventional Concrete With 7.5 % Of Egg Shell Ash and Different % Lathe Dust Scrap

S NO	MIX	EGG SHELL ASH (ESA) (%)	LATHE DUST (LD) (%)	SLUMP VALUE (mm)
1	M1-ESA7.5LD0	0	0	38
2	M2- ESA7.5LD1	7.5	1	39
3	M3- ESA7.5LD3	7.5	3	40
4	M4- ESA7.5LD5	7.5	5	42
5	M5- ESA7.5LD7	7.5	7	44

Compressive Strength Test

The compressive strength of concrete is one of the most important Properties of concrete in most structural application concrete is implied primarily to resist compressive stress. This test gives us a thought regarding every one of the attributes of cement. With the assistance of this test, we can watch that if Concreting has been done appropriately

Compressive Strength Value of M25 Grade of Conventional Concrete With 2.5 % Of Egg Shell Ash and Different % Lathe Dust Scrap

S NO	MIX	EGG SHELL ASH (ESA) (%)	LATHE DUST (LD) (%)	COMPRESSIVE STRENGTH TEST (N/mm2)
1	M1-ESA2.5LD0	0	0	28.91
2	M2- ESA2.5LD1	2.5	1	30.76
3	M3- ESA2.5LD3	2.5	3	33.56
4	M4- ESA2.5LD5	2.5	5	32.85
5	M5- ESA2.5LD7	2.5	7	31.34

Compressive Strength Value of M25 Grade of Conventional Concrete With 7.5% Of Egg Shell Ash and Different % Lathe Dust Scrap

S NO	MIX	EGG SHELL ASH (ESA) (%)	LATHE DUST (LD) (%)	Compressive strength test (n/mm2)
1	M1-ESA7.5LD0	0	0	28.98
2	M2-ESA7.5LD1	7.5	1	32.45
3	M3-ESA7.5LD3	7.5	3	34.63
4	M4-ESA7.5LD5	7.5	5	33.62
5	M5-ESA7.5LD7	7.5	7	32.84

6. CONCLUSION

The experiment shows that the effect of Egg Shell Ash and Lathe dust scrap with normal concrete can still be a promising work as there is always a need to overcome the problem of brittleness of concrete. The following conclusions could be drawn from the present investigation.

2.5% Egg Shell Ash with different percentages of Lathe Dust: –

The maximum compressive strength of specimen after 28 days is 33.56 N/mm² with 2.5% of Egg Shell Ash with 3 % of lathe dust with comparisons of normal concrete and other mix. It is 16 % increase overcome with normal concrete.

7.5% Egg Shell Ash with different percentages of Lathe Dust: –

The maximum compressive strength of specimen after 28 days is 34.63 N/mm² with 7.5% of Egg Shell Ash with 3 % of lathe scrap with comparisons of normal concrete and other mix. It is 20 % increase overcome with normal concrete.

From the above points it can be concluded that Lathe Scrap reinforcement is very effective for improving the strength characteristics, cracking and Egg Shell ash for workability of the concrete. Therefore, the performance of the concrete will be improved if proper design and construction methodology is adopted.

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