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Study of Conventional Concrete with Lathe Dust Scrape and Egg Shell Powder

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***Abstract*-- To enhance the characteristics of concrete; some scrap materials are incorporated besides egg shells ash. In this effort a effect of lathe dust (scrap) additives can be combined with concrete to design for specific applications and optimize workability and strength properties. The egg shells ash contributing 5% and 10% 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. Finally we obtained that by addition of scrap and mineral admixture the concrete increase their properties as compare to normal concrete mass.**

Keywords **- Conventional concrete, strength –properties, egg shells ash, scrap, lathe dust, industrial waste.**

I. INTRODUCTION

Eggshell known as a smooth surface that is desirable compared rough eggshells fracture more easily. Most good quality eggshells of commercial layers contain approximately 2.2 grams of calcium in the form of calcium carbonate. About 95% of the dry eggshell is calcium carbonate weighing 5.5 grams. The average eggshell contains about 0.3% of magnesium, phosphorous, and traces of sodium, zinc, potassium, iron, copper and manganese. There are many factor influences in quality of eggshell which is nutrient adequacy, flock health problem, environmental condition and breeding. Apart from that, the controlling rate of egg weight also contributes to a good quality of eggshell and it is not depends on the thick eggshell mean strong. Sometimes, thinner eggshell is stronger than thicker eggshell. This fact is due to shape and organization of organic and inorganic component of the shell. Eggshell waste can be used as fertilizer, animal feed ingredients and other such uses. However, majority of the eggshell waste is deposited as landfills. Eggshell waste in landfills attracts vermin due to attached membrane and causes problems associated with human health and environment. The aim of this review is to spread awareness of egg shell powder as a constructional material. Fig.1.Egg shell powder sieved through 90 micron sieve II.

II. LITERATURE REVIEW

Prashant Abrol (2020) has been studied that the importance of cement in modern society cannot be overestimated. There is no escaping from the impact of cement, that it makes our everyday life. Effective deployment of bio-waste has been given importance in our society for environmental and economic concerns. Reclamation of eggshell from hatcheries, home, bakeries and industries is an efficient and cost- productive way to reduce waste disposal and prevent serious environmental issues. **Chong Beng Wei et al (2020)** they studied that Solid waste management is one the leading problems faced by developing nations. In Malaysia, the average per capita generation of municipal waste is about 0.85 kg per person per day, and this number is only expected to raise as the population grows and nation becomes more industrialized. One of the wastes is eggshell waste, as Malaysians have among the largest egg consumption in the world. This paper presents the properties of cement mortar with fine eggshell powder as partial replacement of cement. Type-N mortar was prepared with cement: sand: water ratio of 1: 2.75: 0.60 and the percentages of cement replacement tested are 2.5%, 5%, 7.5% and 10% by weight of cement. **Nikita Vaidya and Prof. M. P. Bastwadkar (2019)** has been studied that in current days, a common trend exists to decrease usage of normal sources and recycle waste materials. Concrete plays the key position and a huge quantity of concrete in production. Eggshell waste is massive in global. And eggshell is made up with calcium so it is allowed to concrete as partial substitute of Portland cement. The purpose of this work is to observe the performance of waste eggshell powder (ESP) as partial alternative of Portland cement in concrete to improve the strength in addition to reuse of waste eggshell powder. Eggshell powder is used in numerous mixtures which can be replaced at 5% intervals from 0% to 20% through weight of cement in concrete. After curing period of 28 days, it is checked for its compressive strength, split tensile strength, flexural strength test and durability test are taken. These are in comparison with a normal mixture which is 0% of ESP and determine the best combination of replacing the material.

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Ashfaque Ahmed Jhatial et al (2018) has been studied that concrete is the most preferred building material in the world and its production has increased exponentially with the rapid construction of infrastructures. The generation of waste materials has also increased due to rapid urbanization. Eggshell is one such solid waste material which is being generated in huge quantity due to it being a cheap source of nutrition.

III. 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.

IV. 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 test 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.

V. 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 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-ESA5LD0	0	0	38
2	M2- ESA5LD1	5	1	38
3	M3- ESA5LD3	5	3	39
4	M4- ESA5LD5	5	5	41
5	M5- ESA5LD7	5	7	43

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SLUMP CONE VALUE OF M25 GRADE OF CONVENTIONAL CONCRETE WITH 10 % OF EGG SHELL ASH AND DIFFERENT % LATHE DUST SCRAP

S NO	MIX	EGG SHELL ASH (ESA) (%)	LATHE DUST (LD) (%)	SLUMP VALUE (mm)
1	M1-ESA710LD0	0	0	39
2	M2- ESA10LD1	10	1	39
3	M3- ESA10LD3	10	3	41
4	M4- ESA10LD5	10	5	43
5	M5- ESA10LD7	10	7	45

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 give 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 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-ESA5LD0	0	0	28.85
2	M2- ESA5LD1	5	1	30.48
3	M3- ESA5LD3	5	3	33.89
4	M4- ESA5LD5	5	5	32.49
5	M5- ESA5LD7	5	7	31.49

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COMPRESSIVE STRENGTH VALUE OF M25 GRADE OF CONVENTIONAL CONCRETE WITH 10 % 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-ESA710LD0	0	0	28.19
2	M2- ESA10LD1	10	1	31.48
3	M3- ESA10LD3	10	3	32.95
4	M4- ESA10LD5	10	5	32.52
5	M5- ESA10LD7	10	7	31.48

VI. 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.

5 % Egg Shell Ash with different percentages of Lathe Dust; –

The maximum compressive strength of specimen after 28 days is 33.89 N/mm² with 5% of Egg Shell Ash with 3 % of lathe dust with comparisons of normal concrete and other mix. It is 18 % increase overcome with normal concrete.

10 % Egg Shell Ash with different percentages of Lathe Dust ;–

The maximum compressive strength of specimen after 28 days is 32.95 N/mm² with 10% ofEgg Shell Ash with 3 % of lathe scrap with comparisons of normal concrete and other mix. It is 17 % 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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