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Experimental Study of Characteristic Strength of Concrete Replacement with Metamorphosed Calcium Carbonate as a Partial Substitution of Cement for M20 Grade

Divyam Soni^a, Mrs. Priyanka Dubey^b

^aM. Tech. Scholar, Dr. A. P. J. Abdul Kalam University, Indore, Madhya Pradesh, India

^bAssistant Professor, Dr. A. P. J. Abdul Kalam University, Indore, Madhya Pradesh, India

ABSTRACT

Concrete is playing very major part in construction. Nowadays many material is introducing to the concrete. Marble Dust is a rising compact that will permit the concrete manufacturing to take benefit of substantial use, produce financial profits and made buildings that will be strong, durable and environmentally friendly. Potential use of Marble Dust can be a good way to replace a bond made of cement as the efficiency of performance increases due to the presence of lemon. Industrial waste creates environmental problems. Therefore, the use of this waste residue should be used. It is appraised that numerous million tons of Marble dust was formed through the global quarry. The use of marble powder has therefore become an important alternative to the efficient use of concrete for advanced concrete structures. Marble dust contains a high content of more than 50% calcium oxide. To avoid adverse environmental conditions, cement content is reduced to concrete and substituted by marble dust which decreases costs and the accumulation of waste marble dust also increases the strong point and durability of concrete. Marble dust returned to cement various percentage by the weight of the M20 grade concrete. Concrete mixes were verified and associated with the compressive strength of standard cement concrete for final setting time at 150mm kg.

Keywords: Marble Dust, Compressive Strength, W/C Ratio, Replacement.

INTRODUCTION

It is estimated that several million tons of Marble Dust Powder was produced during the global excavation. The use of marble powder has therefore become an important factor in the efficient use of concrete for advanced concrete structures. Marble is a metamorphic rock derived from the conversion of pure limestone. The purity of the marble comes in its color and its appearance is white when limestone is made only of calcite (100% CaCO₃). Marble is used in construction and decoration; Marble is strong, looks good, and is therefore in high demand. Naturally, crystalline marbles are composed mainly of minerals calcite, dolomite or serpentine. Some mineral components vary from origin to origin. The main pollutants of green cement (cement) that can affect the cement structures are finished with magnesia, phosphate, trace, zinc, alkalis and sulfide. A large amount of Marble Dust Powder was formed during the cutting process. The result is that 20% of the total marble debris reached in the millions reaches tons. Leaving these products directly can cause a natural problem.

In addition, there is a limit to the availability of natural compounds and minerals used to make cement, and it is necessary to reduce the energy and energy consumption of carbon dioxide from construction processes, a solution to this problem is sought through the use of Marble Dust Powder as part of Portland slag cement. In India, Marble Dust Powder is muddy and discarded which causes environmental pollution, in addition to summer dust and threatens agriculture and public health. Therefore, the use of Marble Dust Powder in various sectors of the industry especially the construction industry, agriculture, glass and paper will help protect the environment. Hosting can be used to produce new products or can be used as additives so that natural resources can be used more efficiently

OBJECTIVE

The main objectives of this research paper are:

- To study the effect of exchanging the cement by marble waste powder on the physical properties.

- Study the effect and future usage of exchanged new graded concrete.
- To study the properties of concrete by partial additional of cement by marble powder.
- To accomplish the wanted strength of specific grade of concrete by partial additional by marble powder waste.

MATERIALS USED

- Cement
- Sand
- Coarse Aggregate
- Marble Powder

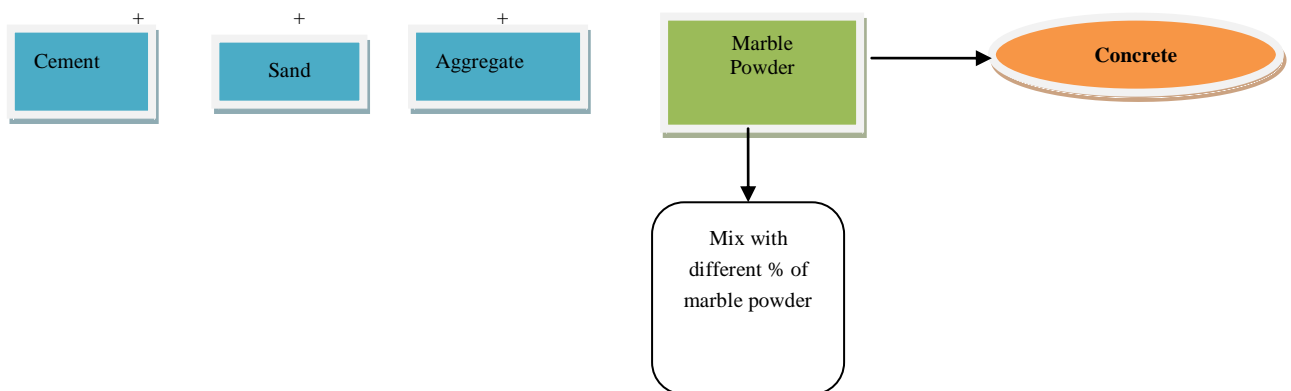
Since the concrete can be formed with the help of basic constituent materials like cement, sand & aggregate with water. The partial mix is taken with other extra material powder.



Fig. 1. Marble Powder

METHODOLOGY

Concept of partial mix approach is taken in the different mix.



RESULTS AND DISCUSSIONS

Compressive Strength Test: A minimum of three cubes are casted in each batch mix for determining compressive strength. Tests are performed at the age of 28 days of the specimens. The results are.

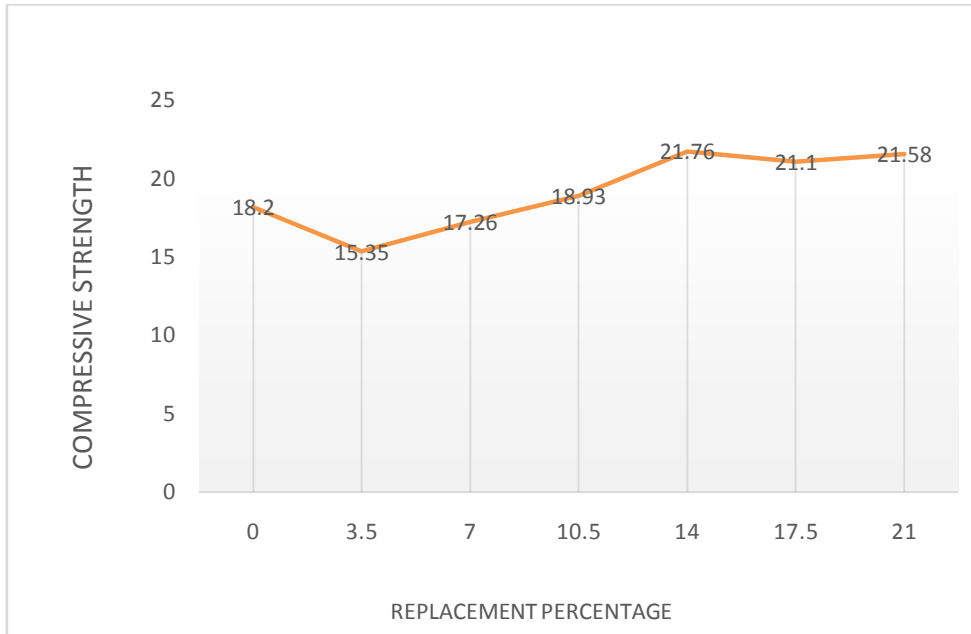


Fig. 2. : Compressive Strength for 7 days (in N/mm²)

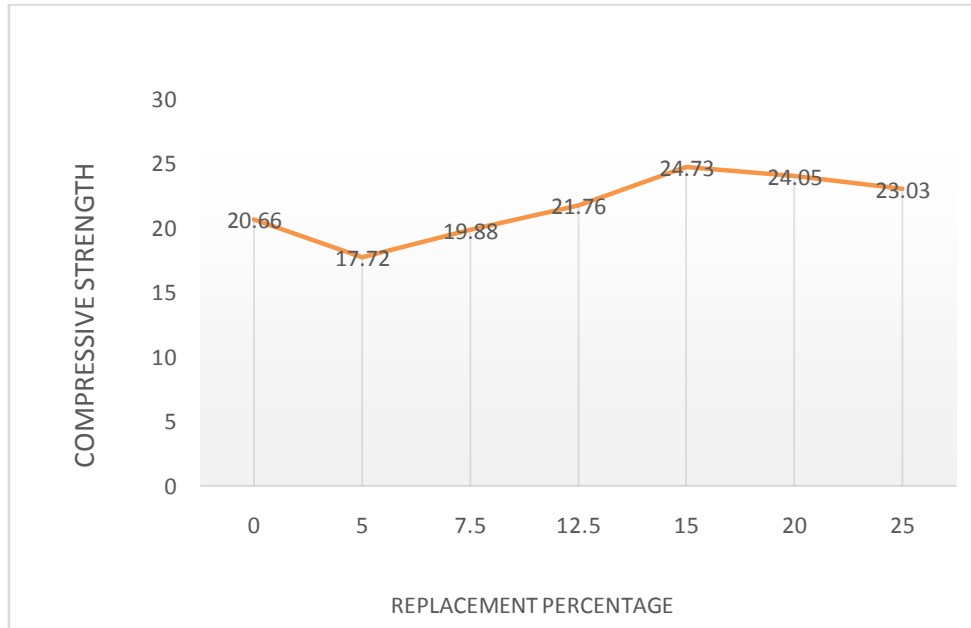


Fig. 3: Compressive Strength for 14 days (in N/mm²)

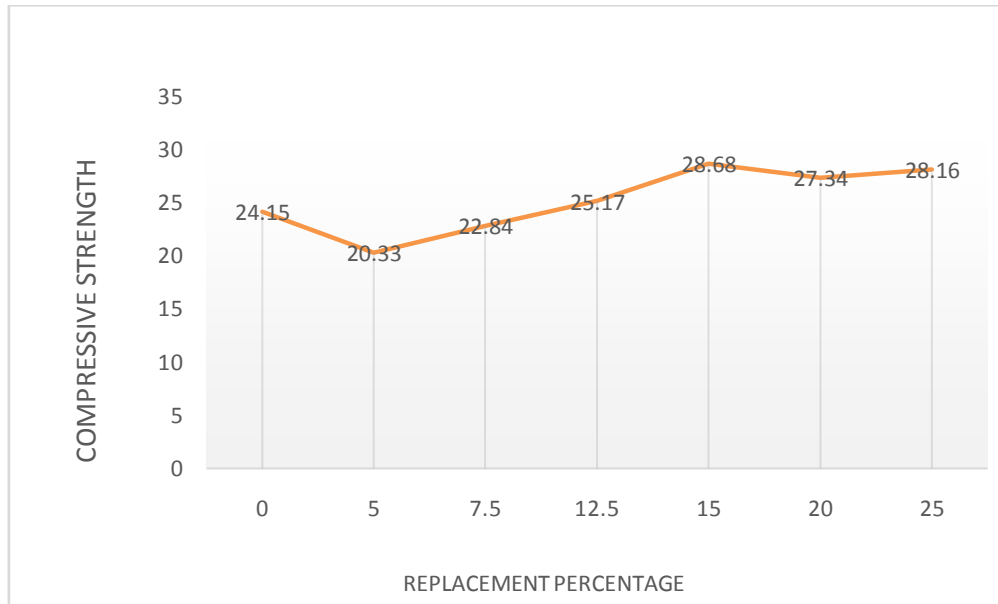


Fig. 4. : Compressive Strength for 28 days (in N/mm²)

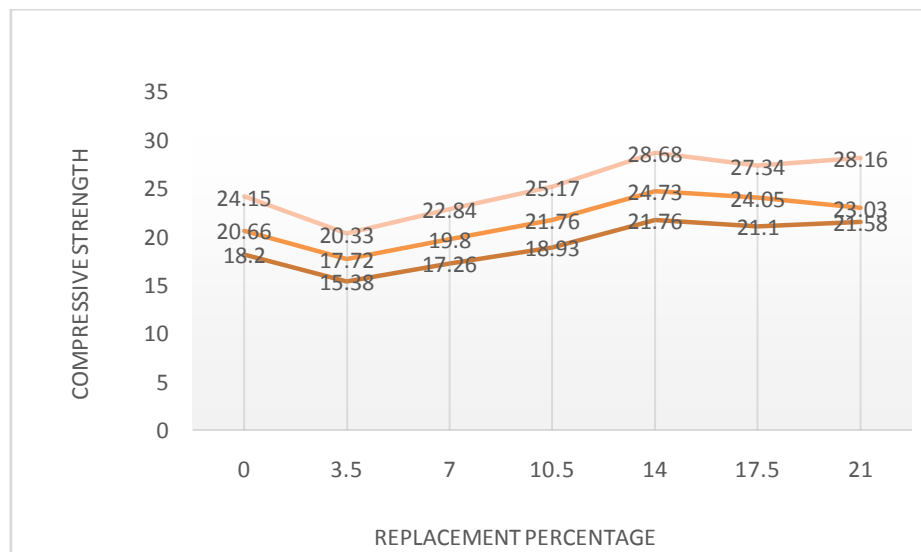


Fig. 5.: Compressive Strength for various days (in N/mm²)

CONCLUSION

After performing the test and analyzing their result, the following conclusions have been derived:

- 1) The consequences accomplished from the current study shows that waste Marble Dust is excessive efficiency for the consumption in concrete as additional of cement.
- 2) The compressive strength of various aspect when cement is partially replaced 14% by Marble dust , compressive strength is increased by 27.68%. Later when addition of % of Marble Dust is replaced, strength starts decreasing, a minimum strength is achieved
- 3) After achieving 7 days strength is analyzed, 14 % replacement of marble dust gives 24.5% more strength when compared with conventional concrete.
- 4) After achieving 28 days strength in graph 3 shows an increment of 26.85% of strength of 14% replacement of marble dust as compared with conventional concrete.
- 5) Again, strength is decreased when addition of percentage of marble dust As discussed here, it can be said that an increment in

compressive strength of 14 % replacement of marble dust gives 27% strength is achieved as compared with conventional concrete mix i.e. Mix-01.

- 6) Workability of concrete reductions as amount of Marble Dust increases this is the major observation which we have taken.
- 7) Maximum compressive strength was observed when Marble Dust replacement is about 14%.

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