

Utilization of Limestone Dust and Marble Dust in Concrete

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Abstract— Marble dust is a waste material which is obtained from the marble quarrying plants. This is generally of used in landfills, in this project a study has been carried out on concrete to check suitability of marble dust in concrete and its effects, marble dust is added in concrete from 0 to 100% at an interval of 25% as a partial and full replacement of fine aggregate and its properties like workability, compressive strength is check. For this project M 40 concrete is casted and marble particle between 90 micron to 4.75 mm is used in this study which is differentiate by IS sieve.

Key words: Concrete, Marble Dust, Fine aggregate, High Strength Concrete, Compressive Strength, Flexural strength, Workability

I. INTRODUCTION

Marble is a building material commonly used in decoration in palaces and monuments since ancient times. Marble is a metamorphic rock formed by the transformation of limestone which is sedimentary rock by pressure and heat in the earth crust by geological process. Chemically it content calcite, dolomite or serpentine material which make marble as a crystalline rocks and other mineral differ from origin to origin. Marble are hard, compact and very fine grained metamorphosed rocks capable of taking shining polish. Marble is durable, has a noble appearance and huge demand in construction and decoration. Marble dust is waste product produced in the cutting process of marble. A huge amount of waste product is generated during cutting process of marble. A millions of tons of marble dust is generated by these industries and formation of marble dust can cause serious environmental problem if it is dumped to the environment directly. Due to daily increasing production of these waste material and limited number of landfill and therefore researchers give attention to more sustainable use of these raw material in construction development and forming a new product. A most important element of concrete is cement and cement industry is major producer of carbon dioxide which increases green house gas of 5 to 10 percent. Sometime these marble dust is used as a filler in cement reduces the amount of green house gas and most valuable is the saving of our precious natural resouses. Marble dust is also used in partial replacement of natural sand which make the concrete economical and if proper proportioning is done some strength of the concrete also increases. It is also used in filler in concrete and paving material and by adding total void content in the concrete. It is mixed with cement and sand by partially to make building, sculptures, floors, dams, mass concreting, etc.

II. METHODOLOGY

Material used for this project is, Ordinary Portland cement of grade 43, natural river sand as fine aggregate along with crushed stone as coarse aggregate, with locally available marble dust and clean water. 15*15*15cm cube is casted along with 15*15*70 cm beams to check properties like

compressive strength and flexural strength. Slump cone test is also performed to check workability of the concrete.

III. RESULT AND DISCUSSION

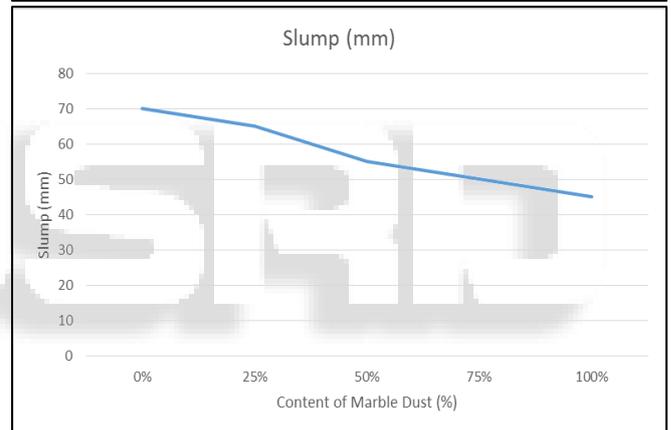
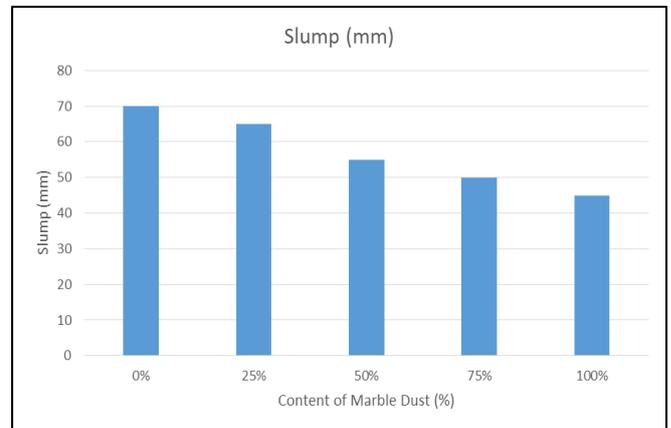
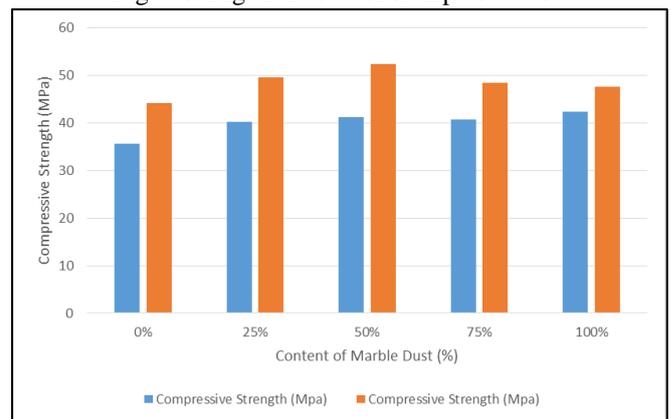


Fig. 1 & Fig. 2: Result of slump cone test



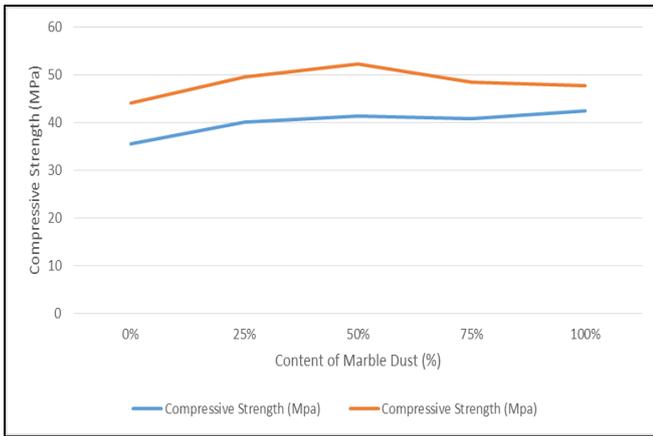


Fig. 3: and Fig. 4: Result of Compressive Strength Test

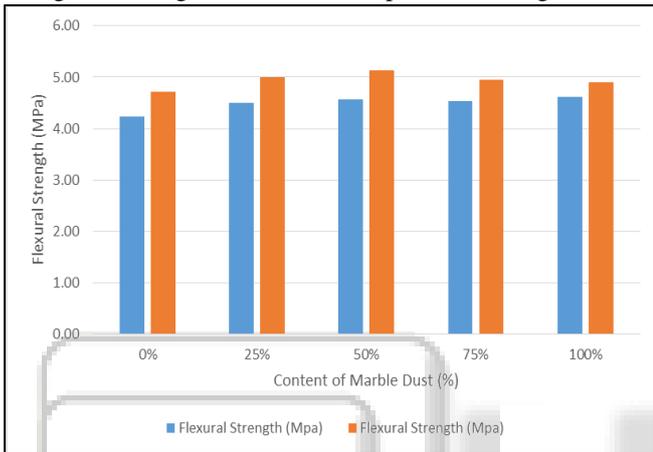


Fig. 5 and Fig. 6: Flexural Strength of Concrete

graph 1 and graph 2 shows result of slump cone test of when fine aggregate is replaced by marble and it has been observed that marble dust decreases the workability of the concrete. Graph 3 and graph 4 shows result obtained after compressive strength test on concrete cube and it has been observed that initially marble dust increases the compressive strength of concrete upto 50% then compressive strength is decreased, when marble dust is further introduced in concrete. Graph 5 and graph 6 shows result obtained after flexural strength test on concrete beams and it has been observed that initially marble dust increases the flexural strength of concrete upto 50% then flexural strength is decreased, when marble dust is further introduced in concrete.

IV. CONCLUSION

Conclusion drawn, when a study is carried out on concrete when marble dust is introduced in concrete as a fine aggregate replacement, it has been observed that workability decreased suddenly. So it has been concluded that marble dust decreased slump value (Workability) when marble dust is introduced in it. Compressive strength of concrete is decreased initially upto 50% then decreased suddenly. Hence it is concluded that optimum value of marble dust in concrete for compressive strength is 50%. Flexural strength of concrete is decreased initially upto 50% then decreased suddenly. Hence it is concluded that optimum value of marble dust in concrete for flexural strength is 50%. Result of study also shows that result came out from compressive strength is more than designed strength Hence all mix are use useable but some superplasticizer because marble dust decreases workability.

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