



Review-A Study on Partial Replacement of Cement by Marble Dust in Concrete

¹Rahul Tandekar, ²Prof. Rahul Sharma

¹M. Tech Scholar, Department of Civil Engineering, Prashanti institute of Technology & Science, Ujjain,

²Professor, Department of Civil Engineering, Prashanti institute of Technology & Science, Ujjain,

ABSTRACT—

Improving the properties of concrete by addition of waste marble powder is becoming popular now a day because it helps in achieving the economy and is a superior alternative as concrete ingredient, which offers high strength. In this project we have investigated the mechanical characteristics of concrete cubes, beams & cylinders made by partially replacing cement with concrete. In this research we have conducted various tests on materials like cement, sand & aggregate.

Keywords: Marble Dust, cement, sand, Aggregate, Concrete

1. INTRODUCTION

Concrete is the most extensively used and adaptable building material which is generally used to resist compressive forces. Since the use of cement and production of cement creates much more environmental issues and also it is long process. Hence Marble Dust can be used as a developing binding material that will allow the concrete industry to optimize material use, and construct structures that will be strong, durable and sensitive to the environment. The probable usage of Marble Dust can be an ideal choice if used as a substitute in a cementitious binder as its reacting efficiency increases due to the presence of lime. The surplus generated from the marble industries causes environmental problems. Hence the reuse of this waste material has to be emphasized. It has been estimated that several million tons of Marble dust are produced during quarrying worldwide. Hence consumption of marble powder has become a significant substitute materials towards the effective application in concrete for enhanced hardened properties of concrete. A marble dust, obtained as a by-product of marble cutting, sawing, shaping was characterized from physical and chemical point of view for using it as binding material in production of concrete and mortar. Marble is a metamorphic rock resulting from the transformation of a pure limestone. Marble dust contains high calcium oxide content of more than 50%.

2. LITERATURE REVIEW

[1] **Ashish Shukla (2019)**: In this research, cement has been partially substituted in different proportion with Marble Dust and various types of tests have been done. In this test, the marble dust has been altered with cement ratio of 0%, 5%, 7.5%, 10%, 12.5%, 15% and 20%, and as a result (concrete two grade M-25 and M-30) Tensile Strength and Compression Strength of the concrete, The test has been done in 7 days, 28 days and 56 days intervals.

[2] **T Naga Sai Sree Saran (2018)**. In this study, Marble Dust powder as been taken to analyze the chemical and physical properties of the concrete which is partial replaced with marble dust powder as fine aggregate by 10%,20%,30%,40% and 50%by weight of fine Aggregate. After replacing this marble dust powder as fine aggregate, cylinders and cubes are casted. After casting this cubes and cylinders, they are using to know its both compressive as well as tensile strength by using compression test and split tensile strength for 7 days and 28 days.

[3] **Satish D (2018)** In present study experimental investigation conducted on optimum marble dust replacement with cement. The replacement ratios which have been studied were 0%, 5%, 7.5%, 10%, 12.5%, and 15% by weight. Water – cement ratio kept 0.42. Concrete made with marble dust as cement replacement achieved better performance compared to normal concrete.

[4] **Vinodhini Ellappan (2018)**: Improving the properties of concrete by addition of waste marble powder is becoming popular now a day because it helps in achieving the economy and is a superior alternative as concrete ingredient, which offers high strength. In this project we have investigated the chemical and physical characteristics of mortar and concrete cubes made by partially replacing cement with concrete. Which showed improved strength characteristics. The optimum levels for replacement of cement by marble powder was determined for M20 and M30 grades of concrete.

[5] **Shanu Sharma (2017)**: To avoid adverse environmental circumstances, the content of cement is reduced in concrete and replaced by MDP which reduces cost and addition of MDP also increases strength and durability of concrete. The MDP was replaced with cement at 0%, 3.5%, 7%, 10.5%, 14%, 17.5% & 21% by weight for M25 grade concrete.

[6] **Surajmal Patidar (2019)**: The marble dust was replaced with Sand at 0%, 5%, 10%, 15% and 20% by weight of sand in M20(1:1.5:3) grade concrete. Concrete mixes were experimentally tested and compared in terms of compressive strength of the conventional cement concrete at 7 days and 28 days for 150mmX150mmX150mm Sized cubes.

[7] **Sameer Khan (2017)**: Marble is a metamorphic rock resulting from the transformation of a pure limestone. Marble dust contains high calcium oxide content of more than 50%. To avoid adverse environmental circumstances, the content of cement is reduced in concrete and replaced by marble dust which reduces cost and addition of marble dust also increases strength and durability of concrete. The marble dust was replaced with cement at 0%, 3.5%, 7%, 10.5%, 14%, 17.5% & 21% by weight for M20 grade concrete. Concrete mixes were experimentally tested and compared in terms of compressive strength of the conventional cement concrete at 28 days for 150mm cubes.

[8] **Mr. Ranjan Kumar (2015)**: In this practical study, the effect of Marble Dust in concrete on strength is found out. Five concrete mixtures containing 0%, 5%, 10%, and 20% Marble Dust as replacement of cement by weight were prepared. Water/cement ratio of 0.43 is used for all the concrete mixes. Compressive strength, split tensile strength and flexural strength of the concrete mixtures are been obtained at 7 and 28 days. The laboratory result shows that replacement of cement with Marble Dust increases compressive strength up to 10%, split tensile strength and flexural strength of concrete up to 15%. The partial replacement of Marble Dust in concrete by cement improved its quality in terms of strength. To preserve the environment, Marble Dust may be used as better partial substitute for replacement of cement in concrete.

[9] **Vijaya Kumar YM (2016)**: During this analysis work, Marble dust Powder have replaced the Ordinary Portland Cement and Portland Pozzolana Cement consequently within the reach of 0%, 5%, 10%, 15% 20% and 25% by weight of M20 grade concrete. Concrete mixtures be developed, tested and compare in terms of compressive strength to the traditional concrete. The main objective of this research is to investigate the behavior of concrete by replacing the Marble dust Powder with varying proportions of cement in concrete.

[10] **Mohammad Athar Hussain (2016)**: In this paper an experimental investigation is carried out to compare the strength characteristic of conventional concrete with the concrete replaced with marble powder as partial replacement of cement. The work is carried out with M20 and M30 grade concrete with w/c ratio of 0.55 and 0.45 respectively as a control specimen and the cement is replaced by marble powder in the range of 0%, 5%, 10%, 15% and 20% by weight of cement. For all the mixes compressive, split tensile and flexural strengths are determined at 28 days. The results of present investigation indicate that marble powder incorporation showed the significant improvements in the compressive, split tensile and flexural strength of concrete up to 10% of replacement.

[11] **Pranali K. Kohad (2013)** The main goal of this study is to check the properties of concrete when the recycled aggregate & marble sludge powder is used as a partial replacement of aggregate. It ultimately helps to evaluate recovery and reuse of byproducts coming from destroyed buildings & marble processing industries. So that it helps to conserves the use of natural aggregate and it preserves the use of landfill for materials which cannot be recycled.

3. CONCLUSIONS:

Based on the previous studies on concrete with varying proportion of MD the results were obtained and discussed in previous chapter from which the following conclusions are drawn.

- The Compressive strength, Split Tensile strength and Flexural strength are increased with addition of waste marble dust up to 10% replace by weight of cement.
- Further any addition of waste marble dust the compressive strength, Split Tensile strength and Flexural strength are decreased.
- Therefore , we conclude that the most suitable percentage replacement of marble dust in concrete is 10%.
- Thus we found out the optimum percentage for replacement of marble dust with cement and it is almost 25% cement for cubes, cylinders and prisms.
- Result of this investigation that marble dust could be conveniently used in making good quality concrete and construction materials

REFERENCES

1. T Naga Sai Sree Saran, T Venkat Das Experimental Investigation on Concrete with Partial Replacement of Fine Aggregate by Marble Dust Powder International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-7, Issue-6C2, April 201
2. Vinodhini Ellappan, V. Amudhan, Prathik. E and Ebenezer Stephen. A EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF CEMENT WITH MARBLE POWDER International Journal of Civil Engineering and Technology (IJCET) Volume 9, Issue 5, May 2018, pp. 741–750, Article ID: IJCET_09_05_082 Available online at <http://iaeme.com/Home/issue/IJCET?Volume=9&Issue=5> ISSN Print: 0976-6308 and ISSN Online: 0976-6316.
3. Shanu Sharma; Siddharth Pastariya; Gajendra Kumar Verma Experimental Investigation on Partial Replacement of Cement with Marble Dust Powder on Properties of Concrete IJournals: International Journal of Software & Hardware Research in Engineering ISSN-2347-4890 Volume 5 Issue 9 September, 2017

4. Surajmal Patidar Experimental Investigation in Concrete by Partial Replacement of Sand with Marble Dust International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 05 | May 2019
5. Sameer Khan¹ , Sagar Jamle² , M.P. Verma³ Experimental Investigation with Marble Dust Powder as a Partial Substitution of Cement for M20 Grade Concrete IJSART - Volume 3 Issue 6 – JUNE 2017 ISSN [ONLINE]: 2395-1052
6. Vijaya Kumar YM, Shruti D, Tharan SN, Sanjay SR, Sricharan PM: Partial Replacement of Cement to Concrete by Marble Dust Powder Volume: 2 | Issue: 05 | May 2016 | ISSN: 2455-3778 IJMTST
7. Devesh Meena: A STUDY ON BEHAVIOR OF MARBLE DUST IN CONCRETE PAVEMENT International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 05 | Aug- 2015 sp-ISSN: 2395-0072
8. Mr. Ranjan Kumar, Shyam Kishor Kumar: “Partial Replacement of Cement with Marble Dust Powder” Int. Journal of Engineering Research and Applications ISSN: 2248-9622, Vol. 5, Issue 8, (Part - 4) August 2015, pp.106-114.
9. Abdullah Anwar, Sabih Ahmad, Syed Mohd. Ashraf Husain and Syed Aqeel Ahmad: Replacement Of Cement By Marble Dust And Ceramic Waste In Concrete For Sustainable Development IJISSET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 6, June 2015 ISSN 2348 – 7968.
10. Prof. Veena G. Pathan, Prof. Md. Gulfam Pathan: Feasibility and Need of use of Waste Marble Powder in Concrete Production IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X PP 23-26 International Conference on Advances in Engineering & Technology – 2014 (ICAET-2014).
11. V.M. Sounthararajan and A. Siva kumar (2013) “Effect of the lime content in marble powder for producing high strength concrete” , Int. Journal of Engineering Research and Applications, ISSN 1819-6608.PP 260-264.
12. Manju Pawar et.al (2014) Feasibility and need of use of waste marble powder in concrete production. ISSN No. 2349-943435.PP 1-6.
13. Corinaldesi V, Moriconi G, Naik TR, (2010), —Characterization of marble powder for its use in mortar and concrete, Const. Build. Mat., 24, pp 113-117.
14. Vaidevi C (2013) Study on marble dust as partial replacement of cement in concrete .ISSN 2319 – 7757.PP14-16.
15. Baboo Rai, et.al (2011) Influence of Marble powder/granules in Concrete mix. ISSN 0976 – 4399, PP 827-834.
16. Abdullah Anwar et.al (2014) Study of Compressive Strength of Concrete by Partial Replacement of Cement with Marble Dust Powder. ISSN (Print): 2321-5747.
17. Md.Gulfam Pathan, Veena Pathan, “feasibility and Need of use of waste marble powder in concrete production’s Journal of Mechanical and Civil Engineerin vol 6 pp 23-26 2011.