

EFFECT ON CONCRETE COMPRESSIVE PROPERTIES USING MARBLE DUST

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Abstract –The solid waste coming out from the industries will help in the conservation of natural resources. The marble powder as a waste material coming out from the marble industries by cutting and sawing process and can be used as the partial replacement of fine aggregates in concrete pavements. Marble powder is present abundantly and degrades the land on which it is laid. The marble powder can improve various properties of concrete viz; compressive strength, flexural strength and reduces the water cement ratio. Marble powder is used at different percentages like 10%, 20%, 30%, 40% & 50% and are tested after 7, 14, and 28 days. The results are then compared with conventional concrete.

1. Introduction

India is producing about 10% of world production of marble. Marble is a metamorphic rock resulting from the transformation of pure limestone. A large quantity of marble dust is produced by cutting or sawing process of marble blocks. The marble industries produce both solid waste and stone slurry and solid waste production is much more, and approximately 40% of waste is generated in the marble industries. This much amount of marble dust generated leads to the environmental problems and may affect the Land fertility

The marble powder used at different percentages like 0%, 10%, 20%, 30%, 40% and 50% and then finding the different properties like compressive strength test, flexural strength test workability by slump test etc

2. Scope

The various use of the marble powder for the construction of road pavements surfaces:

Due to uniform gradation of marble powder, it can be used as the replacement of fine aggregate. Marble powder increases the compressive strength of the concrete. It increases the flexural strength of the concrete.

S.No	Volume of cement/m3	Volume of sand/m3	Volume of coarse aggregate/3	Water cement ratio
1	8 bags	714kg	1500kg	0.52

Compressive strength of cube at different percentage of marble powder

3.RESULT

Table 1: Compressive Strength (7 ,14, 28 Days)

S. No.	Name of Test	%of Marble	No. of Samples	Results(7days)	Avg.Results (7days) (N/mm2)	Results (14days)	Avg.Results (14days) (N/mm2)	Results (28days)	Avg. Results(28days),(N/mm2)
1	Compressive Strength Test	0	1	13.46	13.44	17.30	19.57	22.30	24.00
2			2	13.51		22.75		25.24	
3			3	13.37		18.66		24.30	
4		10	1	14.22	14.66	20.00	19.56	28.80	28.78
5			2	15.11		19.70		28.70	
6			3	14.66		19.00		28.70	
7			1	14.80		26.66		32.60	

8		20	2	15.00	15.10	26.30	26.42	32.10	32.60
9			3	15.50		26.30		33.20	
10			30	1		17.40		27.80	
11		2		17.40	27.93	34.10			
12		3		17.30	27.95	34.50			
13		40	1	15.40	15.40	20.44	21.16	28.30	28.66
14			2	15.50		22.50		29.10	
15			3	15.30		22.55		28.60	
16		50	1	14.90	14.87	17.40	17.20	22.20	21.76
17			2	14.85		17.00		21.80	
18			3	14.80		17.20		21.30	

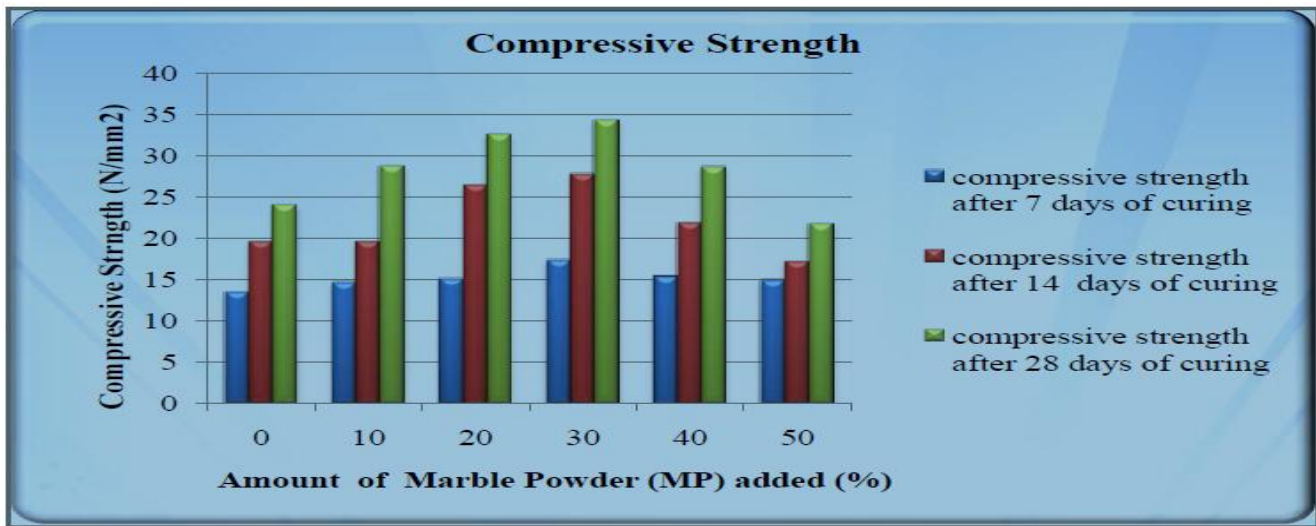


Figure 1: Graph between percentage of MP added & compressive strength

The above graph indicates the compressive strength of concrete having the partial replacement of fine aggregate with marble powder at different proportions. When the percentage of marble powder is increased the compressive strength gets increased up to certain limits (40%) as shown above. The above graph shows the compressive strength of the concrete at 7 days. It can be clearly seen that there is an increase in compressive strength, when there is increase in marble powder. Up to 40% of marble powder when increased, compressive strength also increase but when the addition of marble powder the compressive strength decreases. Similarly compressive strength at 14 and 28 days gets increased up to 40% replacement of fine aggregate with marble powder. From the above graphs it is clearly defined as the marble powder up to 40% can be used as the fine aggregate and give the good strength to the concrete.

3. Conclusion

The compressive strength of the concrete gets increased as the percentage of marble powder is increased; the compressive strength of conventional concrete is 24N/mm² after 28 days of curing. When fine aggregates are partially replaced by marble powder at different proportions that is 10%, 20%, 30%, 40%, and 50% the compressive strength gets increased up to 40%. Further increase in the marble powder leads to decrease in strength. For 40% replacement of fine aggregates the compressive strength is 28.66N/mm².

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