

EFFECT ON CONCRETE FLEXURAL STRENGTH PROPERTIES DUE TO ADDING MARBLE POWDER

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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; 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/m ³	Volume of sand/m ³	Volume of coarse aggregate/3	Water cement ratio
1	8 bags	714kg	1500kg	0.52

Strength of beam at different percentage of marble powder

3.Flexural Strength Test:

Table 1:Results Flexural Strength(7days,14 day,28 days)

S. No.	Name of Test	%of Marble	No. of Samples	Result s(7day s)	Avg.Result s (7days) (N/mm ²)	Results (14days)	Avg.Result s (14days) (N/mm ²)	Results (28days)	Avg. Results(28days),(N/mm ²)
1	Flexural Strength	0	1	2.35	2.17	2.80	2.95	3.15	3.16
2			2	2.22		3.15		3.35	
3			3	1.95		2.90		3.00	
4		10	1	2.55	2.55	3.00	3.00	3.60	3.71
5			2	2.6		3.05		3.8	
6			3	2.5		2.95		3.8	
7		20	1	2.6	2.65	3.55	3.56	4.00	4.01
8			2	2.65		3.58		3.98	
9			3	2.72		3.55		4.02	
10				1	4.09	4.06	3.69	3.67	4.1

11	30	2	4.01	3.99	3.65	3.24	4.08	3.78
12		3	4.1		3.68		4.15	
13		1	3.98		3.2		3.75	
14	40	2	4.00	2.34	3.25	2.82	3.80	3.20
15		3	3.98		3.26		3.78	
16	50	1	2.30	2.34	2.91	2.82	3.20	3.20
17		2	2.38		2.85		3.25	
18		3	2.32		2.80		3.20	

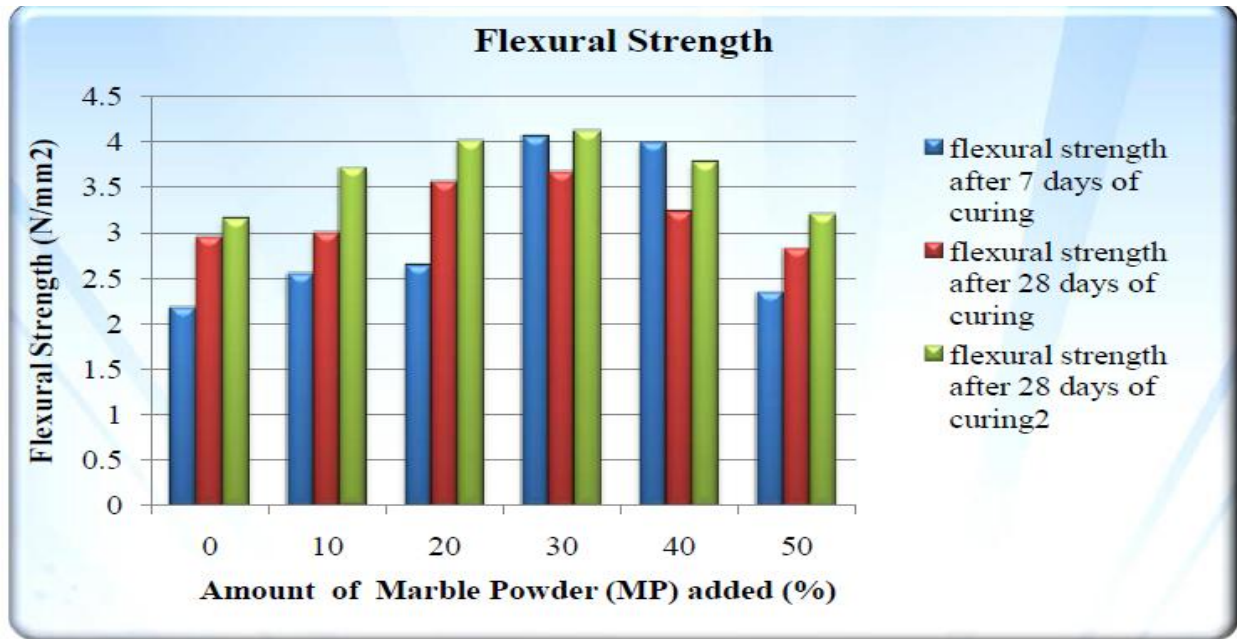


Figure 1: Graph between percentage of MP added & flexural strength

The bar chart shows the flexural strength of concrete in three distinct days that is at 7 days, 14 days, and 28 day and at different percentages of marble powder i.e. 0%, 10%, 20%, 30%, 40%, and 50%. This shows that at 0% of marble the flexural strength after 7 days of curing is 2.17N/mm², after 14 days it is 2.95N/mm² and after 28 days of curing the flexural strength is 3.16N/mm². When the percentage of the marble powder is increased the flexural strength gets increased. Up to 40% of marble, the concrete beam gives good flexural strength. But when the percentage of marble powder is further increased the flexural strength gets decreased that is when fine aggregates are replaced by 40% of marble powder the flexural strength is 3.78N/mm² and gets decreased when marble powder is used beyond 40% and having flexural strength at 28 days of curing of 3.20N/mm².

4. Conclusion

The flexural strength of the concrete also increases when the fine aggregate is partially replaced by marble powder. The flexural strength of conventional concrete is 3.16N/mm² after 28 days, when fine aggregates are replaced up to 40% the strength increase. Further increase in marble powder will affect the flexural strength. With the use of marble powder there is reduction in the land degradation, due to this there is reduction in the environmental pollution.

References

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