Laboratory Investigation in Concrete Mix Design and using by Replacing Stone (Crusher) Dust as Sand

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Abstract— Experiments were conducted on concrete cubes, & beams with various percentages of Stone (Crusher) Dust as Sand i.e. 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 100% by weight of natural sand. For each sample were tested for 7 days and 28 days compressive strength as well as flexural strength test conducted. By testing these samples it has observed that there is an increment in the various properties and strength of concrete by the addition of Stone (Crusher) Dust as Sand. Maximum compressive strength is also at 50 % replacement. The percentage of increase compared with control concrete for M20 and M30 respectively. Maximum flexural strength is also at 50 % replacement. The percentage of increase compared with control concrete for M20 and M30 respectively.

Key words: Concrete, Stone (Crusher) Dust, Sand

I. INTRODUCTION

Structural health monitoring systems allows examiners and engineers to assemble material data of structures and structural elements utilized for analysis. To prevent these problems and fulfill the demand of natural sand there is a alternative solution. Replace natural sand by artificial sand. To keep this fact in mind we study the behavior of concrete in terms of compressive strength and workability while replace natural sand by crushing dust. Crushing dust is a waste product that occurred from stone crushers. Generally this dust is used to fill lower lying areas, filling work in construction. Sometimes it is using to casting the paving blocks. If we used it in concrete then it is an alternative of fine granular material. Crushing dust is cheaply available material that make project economical. In this work we study the effect on concrete in context of workability and compressive strength while replacing sand with varying percentage of crushing dust as well as estimate a conventional concrete mix and concrete mix with varying percentage of crushing dust.

In this project we cast 6 sets of cubes of each grade of concrete with varying percentage of crushing dust (0, 20, 40, 60, 80, 100 % of crushing dust respectively). We find out the slump values for every sample sets & applying compressive strength test after 28 days of casting of cubes and analysis all data with conventionally mixed concrete.

II. RESULT & CONCLUSION

A. Workability (Slump Cone Test) (M-20)

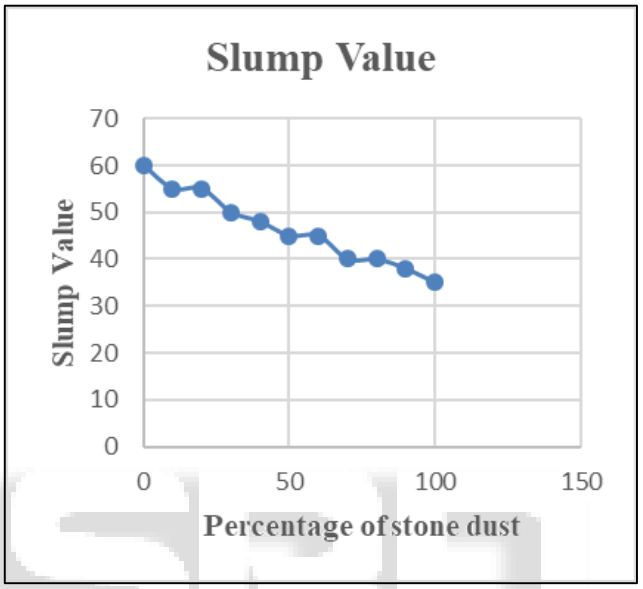

Fig. 6.1: Slump Cone Tests M-20

B. Workability (Slump Cone Test) (M-30)

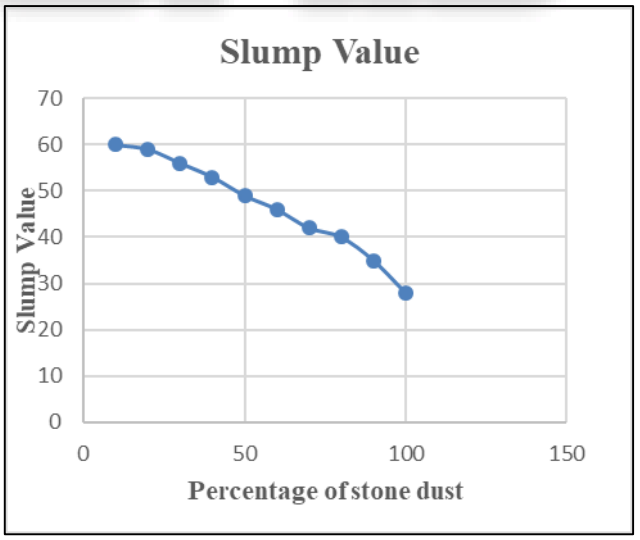

Fig. 6.2 Slump Cone Tests M-30

C. Compressive Strength: -

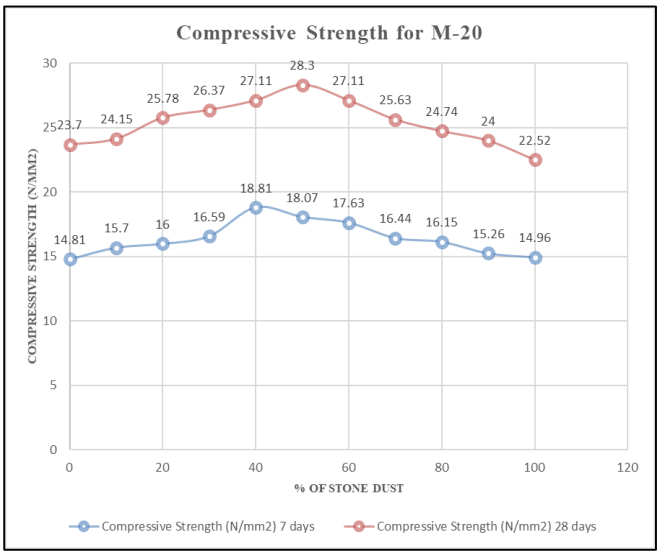

Fig. 6.3: Comp. Strength for M-20 grade Sample

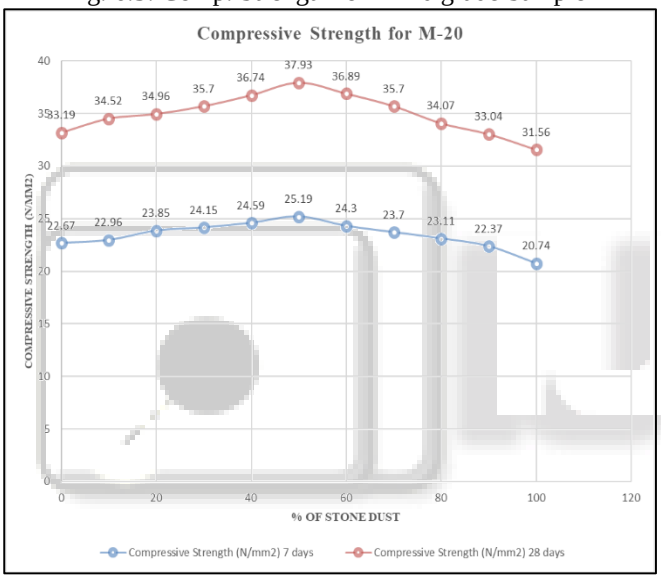

Fig. 6.4: Comp. Strength for M-30 grade Sample

D. Flexural strength: -

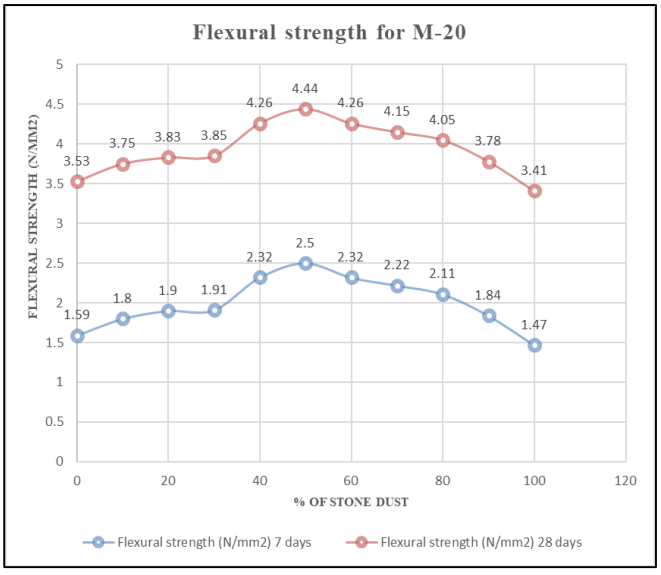

Fig. 6.5: Flexural strength for M-20 grade Sample

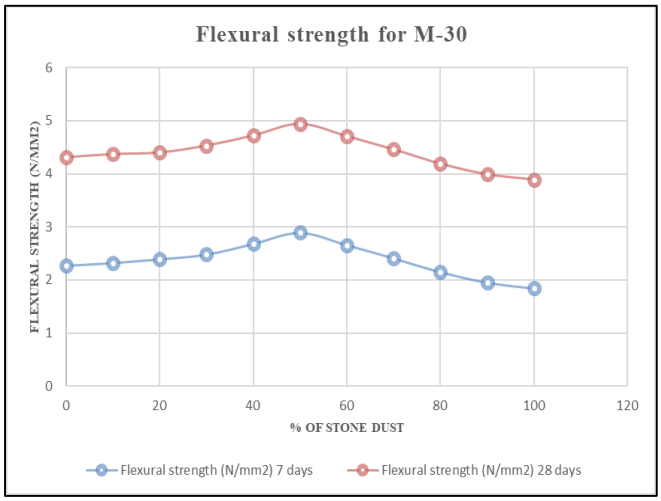

Fig. 6.6: Flexural strength for M-30 grade Sample

III. Conclusion of the Study:

1) Slump value of M-20 and M-30 grades of concrete made using stone dust decreases slump value with increase in replacement of stone dust to river sand.
2) compressive strength of M-20 grades of concrete bye replacement of natural sand to stone dust initially increase compressive strength (1.90% to19.41%) with increasing the stone dust (10% to 50%) and then decreases (14.39% to -4.98%).
3) compressive strength of M-30 grades of concrete bye replacement of natural sand to stone dust initially increase compressive strength (4.01% to 14.28%) with increasing the stone dust (10% to 50%) and then decreases (11.15% to -4.91%).
4) Maximum compressive strength is also at 50 % replacement. The percentage of increase compared with control concrete for M20 and M30 respectively.
5) flexural strength of M-20 grades of concrete bye replacement of natural sand to stone dust initially increase flexural strength (6.23% to 25.78%) with increasing the stone dust (10% to 50%) and then decreases (20.68% to -3.40%).
6) flexural strength of M-30 grades of concrete bye replacement of natural sand to stone dust initially increase flexural strength (1.39% to 14.62%) with increasing the stone dust (10% to 50%) and then decreases (9.28% to -9.78%).
7) Maximum flexural strength is also at 50 % replacement. The percentage of increase compared with control concrete for M20 and M30 respectively.

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