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STUDY OF MECHANICAL PROPERTIES ON M25 GRADE OF CONCRETE BY REPLACING OF DEMOLISHED CONCRETE WASTE INSTEAD OF COARSE AGGREGATE

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ABSTRACT

The hardened Concrete waste can be reused in concrete for achieving the economical construction. In this paper, describes the reuse of demolished concrete in concrete instead of coarse aggregate. Such reusing not only helps conserve natural resources, but also helps to reduce the cost of construction. The demolished concrete was used to replace upto 10% of coarse aggregate. The tests were carried out in laboratory to evaluate the strength properties of normal concrete by using this demolished concrete as coarse aggregate. These tests included workability, unit weight, compressive strength, flexural strength and split tensile strength. Test results give significant strength improvement in concrete.

Keywords: Demolished Concrete, Compressive Strength, Split Tensile Strength and Flexural Strength.

INTRUDUCTION

Concrete is mainly used for the building construction. In this concrete, aggregate is one of the primary component, this is extract from natural resources. We need to protect our environmental by the way of reuse demolished concrete instead of coarse aggregate [Katam Avinash et al., 2016]. It gives greater efficient in concrete as well as optimum environmental protection [Nilesh et al., 2015]. For the concept of sustainable development construction industry, it has now become a guiding principle for the reuse of demolished concrete in new concrete [Manish et al., 2014].

The reuse of demolished concrete in new concrete is technically, economically, and environmentally acceptable [Prakash et al., 2016].

I. EXPERIMENTAL STUDY

The main objective of the study is to add crushed concrete materials at different proportion in order to reduce the wastage of demolished concrete materials.

From the tests were found the compressive strength and split tensile strength of modified concrete containing demolished concrete. And also compared with flexural strength of normal concrete with modified concrete containing demolished concrete.

MIX PROPORTION: Materials Properties and Testing of concrete were studied based on standards [IS 383: 1970, IS 516:1959, IS 1199:1959, IS 456: 2000].

We obtained the mix ratio for M25 concrete IS 10262-2009 code of practice for Concrete Mix Design as mentioned in Table 1.

Table 1: Mix Proportion for M25

W/C ratio	Cement	Fine aggregate	Coarse aggregate
0.4	1	1.53	2.50

Strength Characteristics: Compressive strength of concrete cubes was tested and tabulated as mentioned in Table 2. Based on the test results we compared strength of conventional concrete with modified concrete and represented in graphically as shown in Fig 1.

Split Tensile strength of concrete cylinders was tested and tabulated as mentioned in Table 3. Based on the test results we compared strength of conventional concrete with modified concrete and represented in graphically as shown in Fig 2.

Flexural strength of concrete prisms was tested and tabulated as mentioned in Table 4. Based on the test results we compared strength of conventio nal concrete with modified concrete and represented in graphically as shown in Fig 3.

Table 2: Compressive Strength of Conventional Concrete vs Modified Concrete:

Specimen No	Compressive Strength (N/mm^2) Conventional Concrete			Compressive Strength (N/mm^2) Modified Concrete (10% HCW)		
	7Days	14days	28Days	7Days	14days	28Days
1	18.93	23.25	29.78	19.64	25.25	31.56
2	18.64	23.89	28.33	20.02	24.89	31.33
3	18.78	24.13	29.53	19.18	25.13	31.53

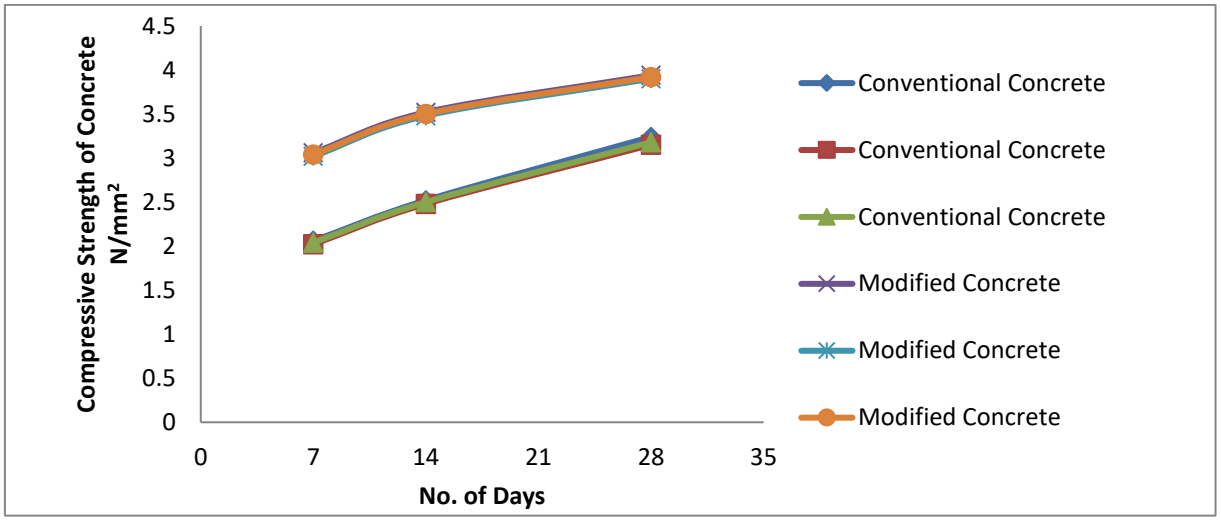

Fig 1: Compressive Strength of Concrete Cubes

Table 3: Split Tensile Strength of Conventional Concrete vs Modified Concrete:

Specimen No	Split tensile strength (N/mm²) Conventional Concrete			Split tensile strength (N/mm²) Modified Concrete (10% HCW)		
	7 days	14 days	28 Days	7 days	14 days	28 days
1	1.03	1.56	1.80	1.53	1.76	1.97
2	1.01	1.60	1.79	1.51	1.74	1.95
3	1.02	1.59	1.86	1.52	1.75	1.96

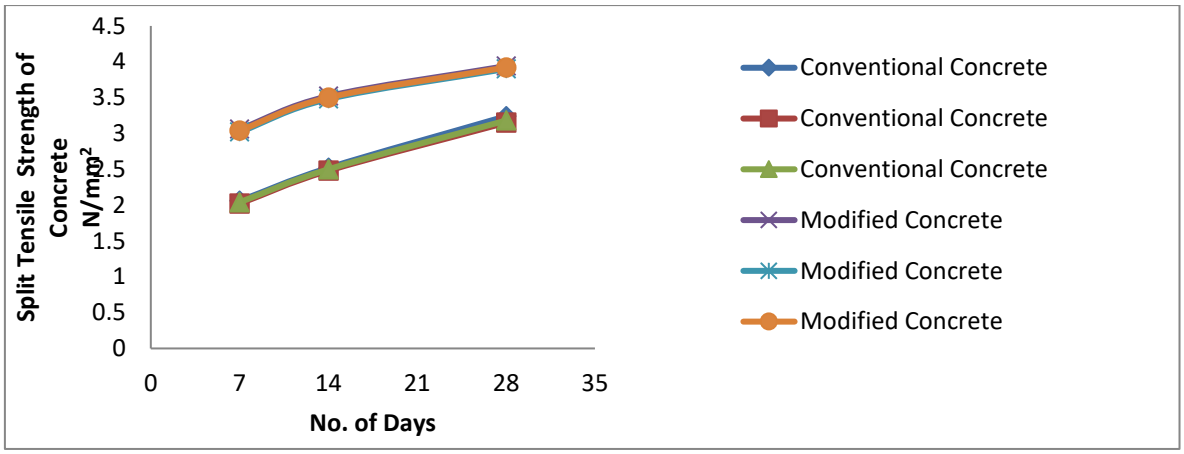

Fig 2: Split Tensile Strength of Concrete Cylinders

Table 4: Flexural Strength of Conventional Concrete vs Modified Concrete:

Specimen No	Flexural strength (N/mm²) Conventional Concrete			Flexural strength (N/mm²) Modified Concrete (10% HCW)		
	7 days	14 days	28 days	7 days	14 days	28 days
1	2.06	2.52	3.24	3.06	3.52	3.94
2	2.02	2.48	3.15	3.02	3.48	3.90
3	2.04	2.50	3.18	3.04	3.50	3.92

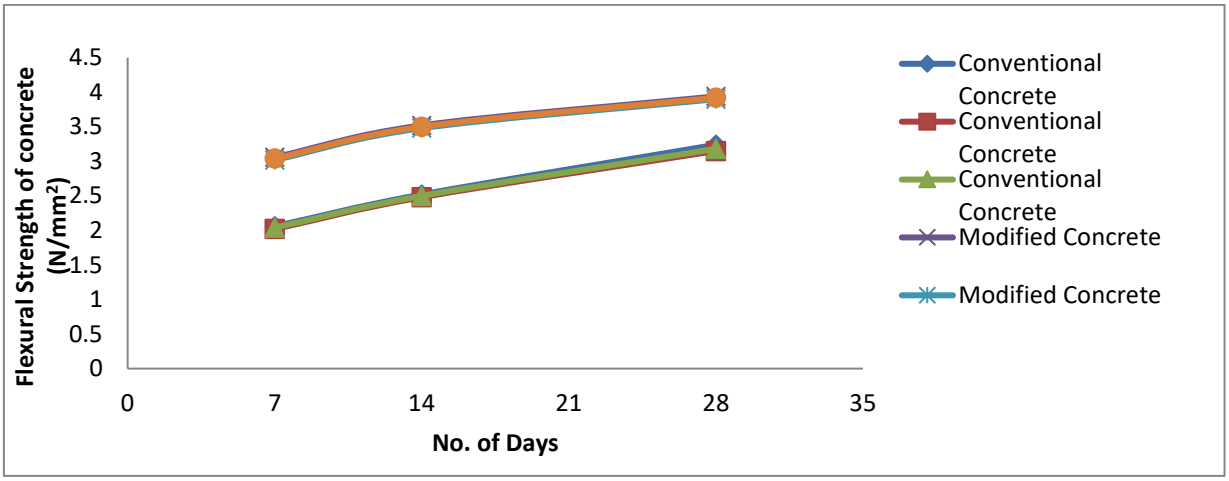

Fig 3: Flexural Strength of Concrete Prisms

III. RESULTS AND DISCUSSION

- It gives the compressive strength, split tensile strength and flexural strength of concrete is slightly more than conventional concrete.
- The mechanical properties of the modified concrete increases while replacing of demolished concrete instead of coarse aggregate 6% more than conventional concrete. Because the strength of the concrete is increases due well bonding between old concrete to new concrete.

CONCLUSION

It identified that Hardened Concrete Waste (HCW) can be disposed by using them as construction materials. Its use will also help in protecting the environment surroundings. The compaction factor shows the workability of the concrete is good. The replacing of HCW shows increase in compressive strength, split tensile strength and flexural strength on 3% when compare to 1% and 2%. The maximum compressive strength of modified concrete cube is 31.56 N/mm^2 whereas the maximum compressive strength of conventional concrete is 29.78 N/mm^2.

The maximum split tensile strength of modified concrete cylinder is 1.97 N/mm^2 whereas the maximum split tensile strength of conventional concrete is 1.86 N/mm^2. The maximum flexural strength of modified concrete prism is 3.94 N/mm^2 whereas the maximum flexural strength of conventional concrete is 3.24 N/mm^2.

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