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EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF SAND BY TEAK WOOD IN CONCRETE

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ABSTRACT: *In this project main objective is to study the partial replacement of the fine aggregate with Teak Wooden Dust with the varying proportion in the concrete and to check the different properties of the concrete by comparing with the controlled concrete. The replacement of Fine aggregate (sand) with certain Teak wooden dust in concrete that makes the structure more light in weight. For making M20 grade of concrete replacing sand with teak wood dust in proportions of 0%, 5%, 10%, 15%, 20%, 25% and 30%. The Workability, strength and durability test are studied in this project. The most important properties of concrete is the compressive strength and Tensile strength. Also, increasing the teak wooden dust incorporation caused decreases in unit weights and strength values of mortars with a parallel increase in water absorption values at all ages.*

Key words: **Teak wood, Teak Wooden dust, fine aggregate, Workability Test, Compressive Strength Test and Split Tensile strength Test**

I INTODUCTION:

The development in the construction industry all over the world is progressing. Many structures are being built, both residential and non-residential. As a result of the increase in the cost of construction materials, especially cement, crushed stone (coarse aggregate), fine sand (fine aggregate); there is the need to investigate the use of alternate building materials which are locally available. Since most building construction works consist of concrete work; therefore, reduction in cost of concrete production will reduce the cost of building construction.

In this topic main aim is to study the partial replacement of the wooden powder dust with the different percentage in the concrete and to check the properties of the concrete by comparing with the normal concrete. The replacement of fine aggregate (sand) with certain wooden powder in concrete that makes the structure more light in weight. The strength, workability and durability test are analyse in this dissertation. The most important properties of concrete is the strength in compressive force. Also, increasing the wooden dust in corporation caused decreases in unit weights and compressive strength values of mortars with a parallel increase in water absorption values at all ages. The wooden powder dust replaced by fine aggregates (sand) gives the properties and the benefits in the actual production of concrete.

OBJECTIVE:

- Effect of use of wooden dust on workability.
- Wooden powder in concrete that makes the structure more light in weight.
- Effect on compression strength of concrete by using wooden dust.
- To give a solution regarding disposal of wooden dust which creates environmental pollution mainly landfill.

II LITERATURE REVIEW:

The present research work is deal with the influence of different replacement proportions of aggregate , sand and cement. In this report we have replaced sand by wooden powder. Some experiments on quarry dust by Akshay G. et all. Civil Engineering Dept. P.R.M.I.T. Amravati, India resulted significant increase in compressive strength, split tensile strength, and modulus of rupture when 40 percent of sand is replaced by Quarry Rock Dust in concrete. Perumal Associate Professor and Head, Department of Civil Engineering, Jayamatha Engineering College, Aralvoimozhi concluded that Concrete acquires maximum increase in compressive strength at 50% sand replacement. The percentage of increase in strength with respect to control concrete is 24.04 in M 20. The overall test results disclosed that quarry waste fine aggregate can be utilized in concrete mixtures as a good substitute of natural sand.

III MATERIAL AND METHODOLOGY:

Portland cement:

The cement used is Ordinary Portland Cement confirming to Indian Standards IS 12269 – 1987 of grade 43.The tests

conducted on cement are standard consistency, initial setting time, final setting time, and specific gravity. On mixing the water, cement hardens and hence all the ingredients are bounded together. Portland cement is the most commonly used cement with the composition of alumina, silica, lime, iron, and gypsum.

Aggregates:

Crushed granite of 20 mm maximum size has been used as coarse aggregate. The sieve analysis of combined aggregates confirms to the specifications of IS 383: 1970 for graded aggregates. The concrete mixtures consist of both coarse and fine aggregates which helps in increasing the strength of concrete. Now a days, sand, gravel, crushed stone, recycled materials, including blast furnace slag, glass (mostly for decorative purposes), and ground-up concrete are used as aggregates.

Water:

Mixing water should not contain abominable organic substances or inorganic ingredients in excessive proportions. In this project clean potable water is used. The water in the concrete mix should be clean and free of impurities. The change in water content with respect of cement decides the properties of the cement like how easily the concrete flows, but also affects the final strength of the concrete. Excess water implies to easier flow of concrete, but decreases its strength.

Wooden dust / Saw dust:

TWD is also known as wood dust. It is the by-product of cutting, drilling wood with a saw or any other tool. it is composed of fine particles of wood. Certain animals, birds and insects which live in wood, such as the carpenter ant are also responsible for producing the saw dust. Wooden powder dust's are produced as a small alternate chips or small fragments of wood during sawing of logs of timber into different sizes.

IV RESULT AND ANALYSIS:

TEST RESULT OF CEMENT

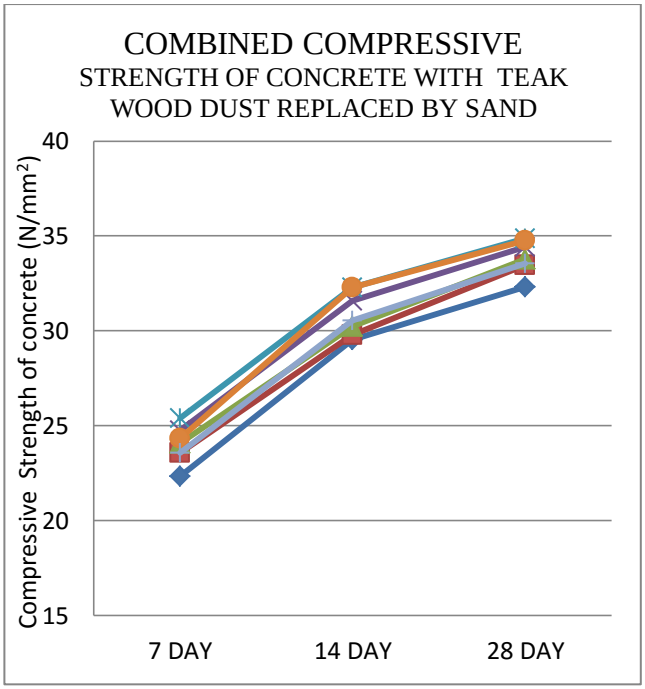
CEMENT TEST	RESULT
Fineness Test	5.8%
Consistency Test	33%
Initial Setting Time	30min 30 Sec
Final Setting Time	10 Hours

TEST RESULTS OF AGGREGATE:

AGGREGATE TEST	RESULT
Bulk Density	1540 Kg/m^3
Fineness Modulus	6.66
Impact Value	9.474
Crushing Value	18.53

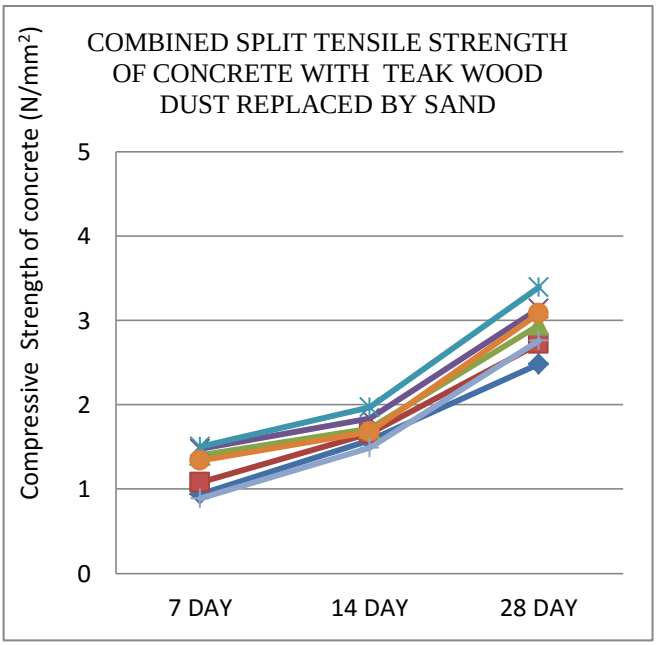
COMPRESSIVE STRENGTH TEST:

The cement is replaced with the alternative material Saw Dust in various quantity such 0%, 5%, 10%, 15%, 20%, 25% and 30% to improve the strength. From Graph 1 it is observed that the Compressive Strength is increases due to the property of silica. The Compressive Strength are 32.33N/mm2 , 33.48 N/mm2 , 33.78 N/mm2 , 34.41 N/mm2 , 34.87 N/mm2 , 34.75 N/mm2 and 33.55N/mm2 , for N_1, TW_1, TW_2, TW_3, TW_4, TW_5 and TW_6 respectively at 28th day of curing. The maximum Compressive Strength gained in the ratio of TW_4, the strength is 24.23N/mm2 , 32.30N/mm2 and 34.87 N/mm2 at 7th, 14th and 28th day of curing which is more than controlled concrete 'N1' that is 22.34 N/mm2 , 29.54 N/mm2 and 32.33 N/mm2 at 7th , 14th and 28th day of curing respectively. It indicates that the Compressive Strength increases upto a certain limit further it starts decreasing.



TENSILE STRENGTH:

The cement is replaced with the alternative material Saw Dust in various quantity such 0%, 5%, 10%, 15%, 20%, 25% and 30% to improve the strength. From graph 2 it is observed that the Split Tensile Strength are 2.48N/mm2 , 2.72 N/mm2, 2.94 N/mm2 , 3.14 N/mm2 , 3.39 N/mm2 , 3.08 N/mm2 and 2.76N/mm2 , for N_1, TW_1, TW_2, TW_3, TW_4, TW_5 and TW_6 respectively at 28th day of curing. The maximum Split Tensile Strength gained in the ratio of TW4, the strength is 1.50N/mm2 , 1.97N/mm2 and 3.39 N/mm2 at 7th, 14th and 28th day of curing which is more than controlled concrete 'N1' that is 0.94 N/mm2 , 1.58 N/mm2 and 2.48 N/mm2 at 7th , 14th and 28th day of curing respectively. It indicates that the Split Tensile Strength increases upto a certain limit further it starts decreasing.



V CONCLUSION:

From the test results, graphs and the relative chemical composition of the specimen a number of conclusions can be drawn. The conclusions drawn are:

1. From the test result it is observed that the Workability of concrete with partial use of teak wood increases upto a limit than it decreases. The workability is in increasing order upto 20% of sand replaced with Teak wood.

2. The Compressive Strength of partially replaced sand by teak wood in concrete of grade M 20 for proportions of 0%, 5%, 10%, 15%, 20%, 25% and 30% are 32.33MPa, 33.48MPa, 33.78MPa, 34.41MPa, 34.87MPa, 34.75MPa and 33.55MPa respectively at 28th day of curing. The Compressive Strength increases upto 20% of use of teak wood further it starts decreasing.

3. The Split Tensile strength of partially replaced sand by teak wood inconcrete of grade M 20 for proportions of 0%, 5%, 10%, 15%, 20%, 25% and 30% are 2.43MPa, 2.72MPa, 2.94MPa, 3.14MPa, 3.39MPa, 3.08MPa and 2.76MPa respectively at 28th day of curing. The Split tensile Strength increases upto 20% use of teak wood further it starts decreasing.

4. With the use of 20% of teak wood in concrete gives the maximum result in compression as 25.40MPa, 32.3MPa and 34.87MPa at 7th day, 14th day and 28th day of curing respectively.

5. With the use of 20% of teak wood gives the maximum result in Split Tensile Strength as 1.5MPa, 1.97MPa and 3.39MPa at 7th day, 14th day and 28th day of curing respectively.

6. Water absorption capacity increases with increasing percentage of wooden powder. Larger absorption of water causes the reduction in the strength.

7. Teak wood is obtained at very low no cost, the cost of concrete can potentially be reduced by replacing sand with TWD in concrete.

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