A REVIEW ON PARTIAL REPLACEMENT OF FINE AGGREGATE WITH SAW DUST FOR LIGHT WEIGHT AND INSULATING CONCRETE

Er.Ilyas Mir[1], Dr. T.K Lohani[2], Er. Sajad Ahmad[3]
[1]M.Tech Scholar, [2]Professor, Department Of Civil Engineering UIET, Lalru ,
[3]Assistant Professor, Department Of Civil Engineering, Emax College Ambala

Abstract: As the present experimental work is concerned "partial replacement of fine aggregate with saw dust for light weight and insulating concrete". In this present experimental work, we incorporate the saw dust with concrete in order to replace the fine aggregates that can be used in the building construction. By adding the sawdust it is not only the fine aggregates content we replace, it also give the good results in case of thermal insulation, workability and surface quality. By adding the sawdust the cost of project can be minimized it can be used for the residential as well as for the commercial purposes it will also help us in depleting natural resources and also gives the desired result it was also found that maximum strength was achieved at the dosage limit 10% beyond that limit the strength decreases. So proper precautions should be taken for allowing the percentage of sawdust with concrete. The slump test, flexural strength test and compressive strength test and split tensile strength test give the desired result as compare to ordinary concrete without the dosage of saw dust. It was concluded that the strength of concrete increases, it also reduces the weight of concrete and we can use it as a light weight concrete. This type of concrete can be used where the ordinary concrete falls, it provides high insulation value and can be used as a fire resistant material. This type of the concrete is used as a flooring material, where the floor is prone to acids. The compressive strength after 7, 14, 21, and 28 days with the incorporation of sawdust was found 11N/mm2, 14N/mm2,16.1N/mm2,19.6N/mm2 this was found at sawdust percentage of 2%.

Keywords : Split Tensile Strength , Compressive Strength Test, Sawdust , Optimum Dosage

I. LITERATURE REVIEW

Sawdust is a by-product of cutting, grinding, drilling, sanding, or otherwise pulverizing wood with a saw or other tool; it is composed of fine particles of wood. It is also the by- product of certain animals, birds and insects which live in wood, such as the woodpecker and carpenter ant. It can present a hazard in manufacturing industries, especially in terms of its flammability. Sawdust is the main component of particleboard. A major use of sawdust is for particleboard; coarse sawdust may be used for wood pulp.

Sawdust has a variety of other practical uses, including serving as much, as an alternative to clay cat litter, or as a fuel. Until the advent of refrigeration, it was often used in icehouse to keep ice frozen during the summer. It has been used in artistic displays, and as scatter. It is also sometimes used to soak up liquid spills, allowing the spill to be easily collected or swept aside. As such, it was formerly common on barroom floors. It is used to make cutter's resins. Mixed with water and frozen, it forms pykrete, a slow melting, much stronger form of ice. Sawdust is used in the manufacture of charcoal briquettes.

Other scientists have a different view, saying the "dilution is the solution to pollution" argument is no longer accepted in environmental science. The decomposition of a tree in a forest is similar to the impact of sawdust, but the difference is of scale. Sawmills may be storing thousands of cubic meters of wood residues in one place, so the issue becomes one of concentration.

According to the flexural strength increased from 1.43 N/mm2 at 7 days to 2.24 N/mm2 at 28 days for control slab (that is about 57% increment). However, the strength of the 25% replacement by sawdust showed increase in flexural strength from 1.15 N/mm2 at 7 days to 1.67 N/mm2 at 28 days (that is 45% increment). Similarly, the 50% replacement of sawdust showed an increase from 0.89 to 1.12 N/mm2 between 7 and 28 days. According to BS 1881, part 4 (1970), a grade 15 concrete should have acquirsed a flexural strength of 1.2 N/mm2 at 28 days. In terms of compressive strength, 25% replacement slab gave a value of 15.9 N/mm2 which is equivalent to grade 15 concrete which a specified value of 15N/mm2 for lightweight concrete (BS 8110, 1997).

As the construction community might well be aware of, incorporating organic materials into solid concrete is not such a good idea to begin with. First of all, its loose molecular structure would cause the structure to fail at a certain stage and second, it would compete and retard the hydration process of cement.

Materials Used:

Sawdust

Sawdust 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. Saw dust concrete is light in weight and has satisfactory heat insulation and fire resistance values.

Fig 1. Sawdust

TABLE 1 Physical Properties Of Saw Dust

S.N.	Properties	Value
1.	Optimum moisture content (%) (OMC)	9.8
2.	Specific gravity (G)	2.15
3.	Soaked CBR (%)	2.95
4.	Un-Soaked CBR (%)	5.20
5.	Fineness Modulus	1.90
6.	Bulk Density (Kg/m^3)	620

Cement

It is an important ingredient of concrete mixture. Cement used in experiment work is white Portland cement.

TABLE 2. Physical Properties Of Cement

S.N.	Characteristics	Values
1	Fineness of cement	5% retained
2	Normal consistency	32%
3	Initial setting time	45 min
4	Final setting time	480 min
5	Specific gravity	3.15
6	Soundness	1.0

Fine Aggregate

Fine aggregate was purchased which satisfied the required properties of fine aggregates required for experimental work and sand conforms to zone 3 as per specifications of IS 383:1970.

TABLE 3. Physical Properties Of Sand

S.N.	Parameter	Values
1	Fineness modulus	2.5
2	Bulk density	1750 Kg/m^3
3	Moisture content	1.85%

Coarse Aggregate:

Aggregates are the important constituents in concrete. Crushed granite of maximum size has been used as coarse aggregate. Sieve analysis of combined aggregates to the specification of IS 383:1970.

TABLE 4. Properties Of Coarse Aggregates

S.N.	Parameters	Values
1	Specific gravity	2.8
2	Water absorption	1.2
3	Impact value	17.6%
4	Crushing value	15.8%

Water

Water is an important ingredient of concrete as it actively participates in the chemical reaction with cement. Since it helps to form the strength giving cement . Water should be free from impurities , Dust as per IS Code 456:2000

Specific Gravity Of Sand

The Pycnometer method can be used for determination of the specific gravity of solid particles of both fine grained and coarse grained soils. The specific gravity of solids is determined using the relation:

$$G = \frac{M_2 - M_1}{(M_2 - M_1) - (M_3 - M_4)}$$

Where M_1=mass of empty Pycnometer,
M_2= mass of the Pycnometer with dry soil
M_3= mass of the Pycnometer and soil and water,
M_4 = mass of Pycnometer filled with water only.
G= Specific gravity of solids
Specific gravity of sand is 2.85.

REFERENCES

[1] IS: 4031 (Part 5):1988-Methods of physical tests for hydraulic cement (Determination of initial and final setting times).
[2] IS: 4031 (Part 4):1988-Methods of physical tests for hydraulic cement (Determination of consistency of standard cement paste) CONSISTENCY\
[3] IS: 4031 (Part 3):1988-Methods of physical tests for hydraulic cement (Determination of soundness)
[4] IS: 2720 (Part 4): 1985-Method of test for soil (Part 4-Grain size analysis)
[5] IS: 383-1910: Indian Standards Code of Specifications for Coarse and Fine Aggregates from natural sources for Concrete
[6] IS: 10262-2009: Indian Standards Code of Concrete Mix Proportionality
[7] IS: 2386 (Part 1):1963-Methods of Test for Aggregates of Concrete
[8] Soil Mechanics and Foundation Engineering by Dr. K. R. Arora

