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Development of Stress-Strain Curves for the Conventional Cement Concrete Containing Aluminum Metalized Postconsumer Plastic Waste

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Abstract:-*The demand of concrete is increasing day by day for satisfying the need of development of infrastructure facilities. Safe disposal of plastic produced by postconsumer activities are the major problem in present scenario as these are non-biodegradable. The experimental work shall be carried out on specimens prepared by M25 grad of concrete. The experimental program shall include addition of macro sized fibers of metalized plastic film in different proportions like 0%, 0.5%, 1%, 1.5% and 2%. To carry out stress-strain curve guidelines given in IS: 516-1959 shall be followed. For every test thee specimens shall casted.*

To determine slump test, compressive test, split tensile testand stress-strain curve test.and to check the feasibility of utilization of metalized postconsumer plastic waste as the concrete constituent. It could be one of the ways of safe disposal of hazardous plastic wastes.

Key Words: *Metallized polyethylene, compressive strength, split tensile strength*

I. INTRODUCTION

Generation of plastic waste is one of the fastest growing areas. Every year more than 500 billion plastic bags are used (nearly one million bag per minute).The biggest component of the plastic waste is polyethylene, followed by polypropylene, polyethylene terephthalate and polystyrene. The disposal of waste plastic is recyclable and non-recyclable of continuous problem for the environment. Disposal of large quantity of plastic bag may cause pollution of land, water bodies and air.
The different, innovative and new research must be required for disposal of plastic waste materials. Post-consumer recycled plastic bags present biggest problems as they are at the present not biodegradable and can resist disposal. Research study will be undertaken concerning the feasibility, environmental suitability and performance of using post-consumer waste plastics in concrete structure.

II. EXPERIMENTAL MATERIALS

1. Cement (OPC):-The ordinary Portland cement of 53 grade conforming to IS: 12269 – 2013 is being used. Initial setting time of cement is 150 minutes, final setting time is 225 minutes, standard consistency is 30.6% and specific gravity of cement is 2.96

2. Aggregate:-The most important ingredient of concrete is aggregate. Good gradation of aggregate is required for workability. Good gradation aggregate minimize the voids of concrete. So, less paste is required to fill up to the voids.

3. Coarse Aggregate:- Locally available 10mm and 20mm size aggregate is used. Physical property is determined, specific gravity of coarse aggregate is 2.73, and fineness modulus is 2.70. Water absorption and natural moisture content of coarse aggregate is 0.5%.

4. Fine Aggregate Locally available river sand is used. It is tested as per the IS code 383:1970, specific gravity of sand is 2.71 and fineness of modulus is 2.85. Water absorption and natural moisture content of coarse aggregate is 0.78% and

5. Water:-Water is an important ingredient of concrete. It actually participates in the chemical reaction with cement. The quality and quantity of water are required to be looked into very carefully.

6. Plastic Waste:-AluminumMetalized films are polymer films coated with a thin layer of metal, usually aluminum. This type of plastic is commonly used for packaging material. In the experimental work, the metalized plastic of following properties was used. The thickness of metalized polypropylene was majored by micrometer.

Table 4.5:- Properties of Aluminium Metalized Polypropylene

Properties	Values
Thickness	60μ
Density	1.4 gm./cc
Type	Polythene film (single metallized)
Category	Metalized food packing grade

III. MIX DESIGN

A mix M-25 grade was designed as per Indian standard method.

Volume Of Concrete	Cement	Water	Fine Aggregate	Course Aggregate (20 Mm)	Fine Aggregate (10mm)
By Weight (Kg/M^3)	438.13	197.16	811.24	596.88	397.92
By Volume	1	0.45	1.85	1.36	0.90

IV. EXPERIMENTAL METHODLOGY

The evaluation of waste metalized plastic adds the concrete testing. Concrete contains cement, water, coarse aggregate and fine aggregate. In this experiment work, waste metalized plastic adds at a rate of 0%, 0.5%, 1%, 1.5% and 2% are compared with data from a standard concrete. Three cube samples were cast on the mould of size 150X150X150 mm for each 1:1.70:2.96 concrete mixand with a w/c ratio as 0.50. After 24 h the specimens were de-moulded and water curing was continued till the respective specimens were tested after 7 and 28 days for compressive strength test and split tensile strength. Slump test were performed for workability of concrete.

1. Slump Test

Slump test was performed as per IS: 1199 – 1959. Cone is used for slump test which has 100mm top and 200mm bottom diameter and 300mm height. Slump was measured by the difference between the height of the concrete cone and the height of the concrete cone after slump.

Figure 1:- Slump Test

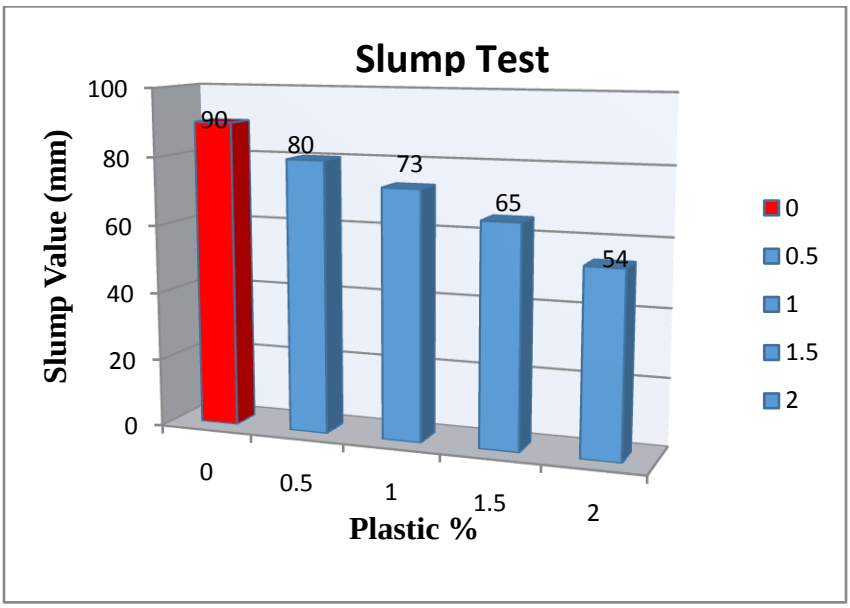

Figure 2:- :- Effect of Used Waste Plastic on Slump

2. Compressive Strength

Its perform on compressive testing machine, cube is placed as shown in figure 3 and continuous loading is applied on it and its reading which is in tone is note down, as per the equation Load/Area, cube compressive stress is find out. In grade of M25 concrete, 3 cubes are casted for each batch. The average compressive strength values of three samples are reported in this paper. The results are shown in figure 4.

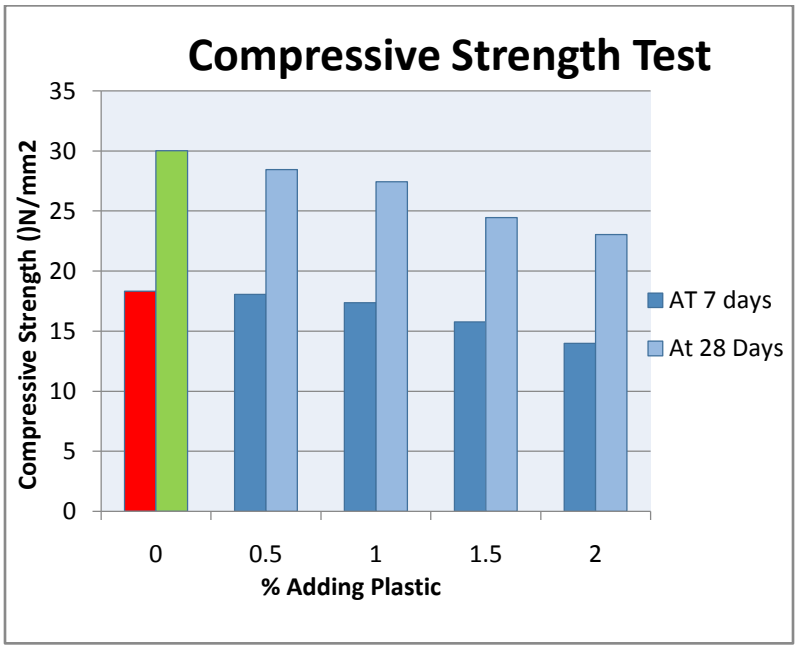

Figure 3:- Compressive Test ApparatusFigure 4:- Effect of Used Waste Plastic on Compressive Strength

3. Split tensile Strength

Split tension test a 150 mm x 300 mm concrete cylinder is subjected to compression loads along the two axial lines which are diametrically opposite. Split tensile strength of concrete cylinder is measured in N/mm^2.In grade of M25 concrete, 3 cylinders are casted for each batch. The average split tensile strength values of three samples are reported in this paper. The results are shown in figure 5 and 6.

Figure 5:- Split Tensile Strength of Concrete

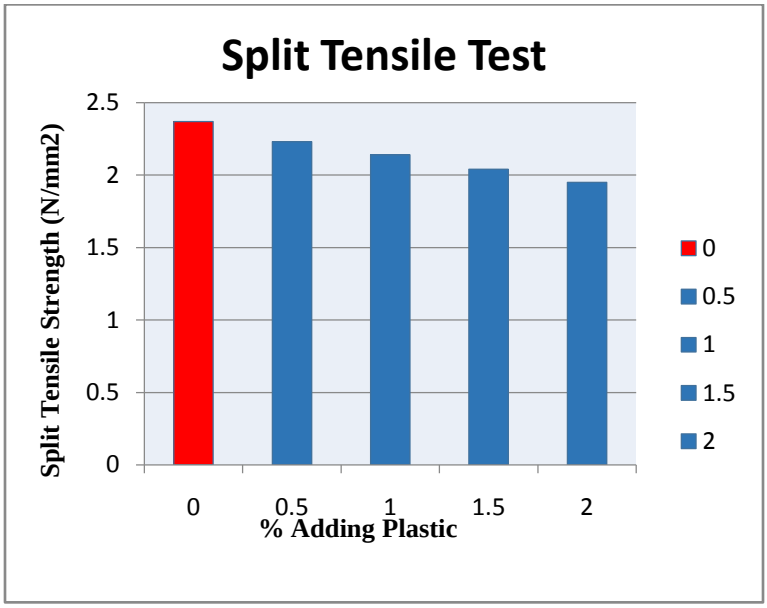

Figure 4:- Effect of Used Waste Plastic on Split tensile Strength

V. CONCLUSION

Based on experimental investigation, the following observations are made:

The experimental work was carried out for the effect of the metalized plastic waste with including different percentage of adding plastic waste. Metalized plastic waste in concrete was subjected to compressive strength, split tensile strength of concrete. This compares with the normal Concrete.

1) The slump was decreased when waste metalized plastic add in concrete, respectively. It was decreased from 20% to 47% as compare to normal concrete.
2) Addition of metalized plastic waste in concrete the compressive strength was decreases. The percentages of addition of metalized plastic waste was increases from 0% to 2%, compressive strength was decreases from the 7days 18.06 to 13.99 as compare to normal concrete test result. And 28 days 28.44 to 23.04 as compare to normal concrete test result.
3) Addition of metalized plastic waste in concrete the Split Tensile strength was decreases up to 2%.The percentages of Addition of metalized plastic waste was increases from 0% to 2%, split tensile strength was decrease from 2.23% to 1.95% in which nominal decrease as compare to normal concrete test result.

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