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FABRICATION OF COMPOSITE MATERIAL USING FLYASH AND PLASTIC POWDER

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Abstract: A composite material and method are described where in melted Waste, chemically unmodified plastic powder and fly ash particles are mixed in a vessel to disperse fly ash particles in the plastic powder material. The resulting mixture then is cooled to solidify the melted plastic powder material to form a composite material having a matrix comprising plastic powder and dispersions distributed in the matrix and comprising fly ash particles. The fresh and hardened properties of waste virgin plastic mix concrete have been studied (CUR Report 1991). A number of concrete mixes were prepared in which sand was partially replaced by waste plastic flakes in varying percentages by volume. Waste plastic mix concrete with and without superplasticizer was tested at room temperature. Forty-eight cube samples were moulded for compressive strength tests at three, seven, and twenty-eight days. Eight beams were also cast to study the flexural strength characteristic of waste plastic mix concrete. It was found that the reduction in workability and consideration, such as heavy mass of concreting in PCC in pavements. If plastic wastes can be mixed in the concrete mass in some form, without significant effect on its other properties or slight compromise in strength, we can consume large quantities of plastic waste by mixing it in the concrete mass. Plastic is one component of municipal solid waste (MSW) which is becoming a major research issue for its possible use in concrete especially in self- compacting concrete and light weight concrete. Although some of these materials can be beneficially incorporated in concrete, both as part of the cementitious binder phase or as aggregates, it is important to realize that not all waste materials are suitable for such use. In Bangladesh about 0.6 million tons fly ash is produced annually and its production is likely to increase significantly due to future power plants. Globally around 20% fly ash is used as concrete related applications. In India, the quantity of waste plastic is increasing day by day this is because increase in population. Plastic is harmful if not properly decomposed, decomposing is a tedious work. It takes too many years to decompose plastic waste and its impact on the environment is very harmful if it burnt cause air pollution. Reuse of waste plastic in construction materials can reduce the risk of disposal and pollution caused due to burning of plastic. Our project, waste plastics of small proportion with fly ash is used to manufacture plate and its mechanical behavior is investigated.

Keywords: fly ash; plastic powder; epoxy resin; hardener;

I. INTRODUCTION

Disposal of plastic waste in environment is considered to be a big problem due to its very low biodegradability and presence in large quantities. In recent time significant research is underway to study the possibility of disposal of these wastes in mass concrete where strength of concrete may not be major criteria under compressive strength, due to partially replacement of sand by waste plastic, is minimal and can be enhanced by addition of super plasticizer. Plastic products are widely used in automobile industry for various purpose in industries.

The costs of the products are increase due to demand and they are affecting the environment. In order to meet their demand fly ash products are used as a replacement for the conventional products. In our project fly ash products are manufactured along with plastic powder in the range of 10%, 20%, 30% .To investigates the strength and workability of products like hollow block. The effect of replacement of waste plastic with fly ash can be evaluated.

II. METHODS

The problem of recycling waste materials will remain one of the problems which will continue to plague the society in the near future. Therefore it is necessary find practical and imaginative solutions to the reuse of the waste. With the less available of space for land filling and due to ever increasing price, the focus is towards reuse of waste rather than its disposal .Plastics are widely used due to their characteristics like versatility, lightness, hardness, chemical resistance etc. and therefore contribute most to ever increasing solid volume waste. The growth of the world plastic industry has been tremendous, from a little over 3 million tons in 1955 to 30 million tons presently (Jain et al., 1977). Among plastic, Polyethene forms the largest portion followed by Plastic powder .The last is obtained in massive quantity from bottles most commonly used for packaging of beverages and drinking water.

III. METHODOLOGY

1. MATÉRIAL COLLECTION

- Fly ash (class F)
- Epoxy resin
- Waste plastic powder

2. PRELIMINARY TESTS OF MATERIAL

3. MIX PROPORTION

- Fly ash (class F)

The fineness of fly ash is important because it affects the rate of pozzolanic activity and the workability of the concrete. Specifications require a minimum of 66 percent passing the 0.044 mm (No. 325) sieve. Although specific gravity does not directly affect concrete quality, it has value in identifying changes in other fly ash characteristics. It should be checked regularly as a quality control measure, and correlated to other characteristics of fly ash that may be fluctuating.

The reactive alumina silicate and calcium alumina silicate components of fly ash are routinely represented in their oxide nomenclatures such as silicon dioxide, aluminium oxide and calcium oxide. The variability of the chemical composition is checked regularly as a quality control measure. The alumina silicate components react with calcium hydroxide to produce additional cementations materials. Fly ashes tend to contribute to concrete strength at a faster rate when these components are present in finer fractions of the fly ash.

Fly ash

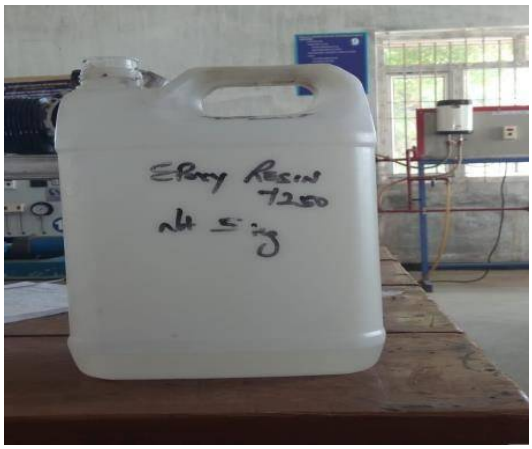
- **PLASTIC POWDER - REPLACING MATERIAL**

The waste material used in this study was virgin plastic and was used as a partial replacement for fine aggregate. It was obtained from the Central Institute of Plastic Engineering and Technology (CIPET) Haripur, Bihar, India. The fineness modulus and specific gravity for plastic waste were 3.2 and 0.91, respectively. A sample of waste plastic is

Plastic powder

- **EPOXY RESIN**

Epoxy resins are the most commonly used thermoset plastic in polymer matrix composites. Epoxy resins are a family of thermoset plastic materials which do not give off reaction products when they cure and so have low cure shrinkage. They also have good adhesion to other materials, good chemical and environmental resistance, good chemical properties and good insulating properties. The epoxy resins are generally manufactured by reacting epichlorohydrin with bisphenol. Different resins are formed by varying proportions of the two: as the proportion of epichlorohydrin is reduced the molecular weight of the resin is increased.



Epoxy resin

2. PRELIMINARY TESTS OF MATERIAL

FLY ASH:

Physical properties:

Specific gravity = 2.70

WASTE PLASTIC POWDER:

Specific gravity = 0.57 Fineness of cement = 90 microns. Sieve size = 425 micron.

EpoxyResin

Specific gravity =1.18 setup time =72hours

Density =1.1-1.4(g/cm$^{3)}$

3 .MIX PROPORTION

FLY ASH	PLASTIC POWDER	Epoxy resin	Hardener
70 %	30%	30%	3 %
65 %	35%	30%	3 %
60 %	40 %	30%	3 %
50 %	50 %	30%	3 %

CONCLUSION

With the addition of fly-ash in epoxy resin – fly-ash composite the compressive strength has been found to increase with increase in fly ash particles.

This increase is attributed to hollowness of fly-ash particles & strong interfacial energy between resin& fly-ash. After reinforcing glass fibre both compressive & impact strength has been increased due to energy absorbed in fibre pull out. ¾ In SEM analysis it has been found that fly-ash particles has been uniformly segregated.

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