

A Review on An Experimental Analysis of Polypropylene Concrete

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Abstract- *Plastics: The word "plastic" means substances which have plasticity, and accordingly, anything that is formed in a soft state and used in a solid state can be called a plastic. Therefore, the origin of plastic forming can be traced back to the processing methods of natural high polymers such as lacquer, shellac, amber, horns, tusks, tortoiseshell, as well as inorganic substances such as clay, glass, and metals. Because the natural high polymer materials are not uniform in quality and lack mass productivity in many cases, from early times it has been demanded in particular to process them easily and into better quality and to substitute artificial materials for natural high polymers. Celluloid, synthetic rubber, ebonite, and rayon are these artificial materials. Presently, it is defined that the plastics are synthesized high. Polymers which have plasticity, and consequently substances made of these natural materials are precluded. Plastics can be separated into two types. The first type is thermoplastic, which can be melted for recycling in the plastic industry. These plastics are polyethylene, polypropylene, polyamide. The second type is thermosetting plastic. This plastic cannot be melted by heating because the molecular chains are bonded firmly with meshed crosslink. These plastic types are known as phenolic, melamine, unsaturated polyester, epoxy resin, silicone, and polyurethane. At present, these plastic wastes are disposed by either burning or burying.*

Keywords- Polypropylene¹, Concrete², Sand³, Cement⁴,

I. INTRODUCTION

Polypropylene

Polypropylene, also known as Olefin, is a synthetic thermoplastic polymer derived from oil and natural gas production. Up until the late 1950's, the gas propylene was a waste product of oil and natural gas facilities. It was not until Italian scientist, Giulio Natta, polymerized the gas propylene and made a commercially feasible plastic polypropylene. Polypropylene is then extruded through a shower head like device known as a spinneret. The spinneret creates the shape and length of threads. After the threads cool, they are spun together in various color and size combinations to make yarns. The polypropylene yarns are then woven into fabric.

Concrete

The mixture includes cement, water, sand, and coarse aggregates (particles of Gravel or crushed stone) mixed in certain proportion. It can be best described in terms Of a simple three-part system:

Portland cement + Water = Cement paste.

Cement paste + Sand = Mortar

Coarse Aggregates + Mortar = Concrete

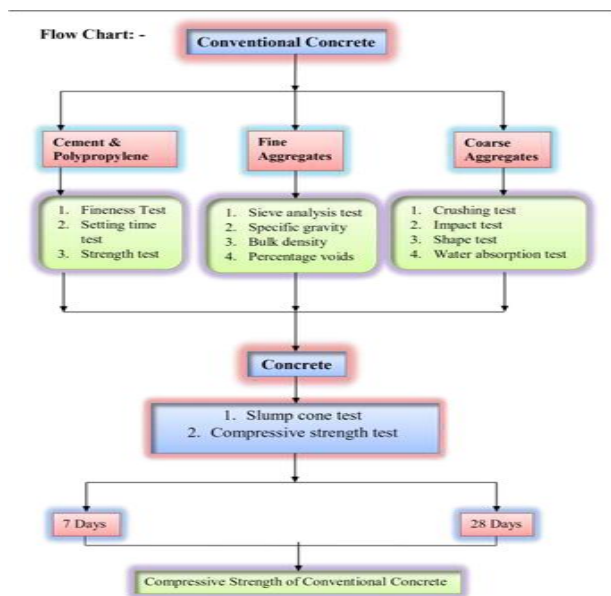
The cement pastes component functions to coat and "lubricate" the individual grains of sand, thereby imparting "workability" to the mortar phase. In turn, the mortar serves to lubricate the coarse aggregate particles and so give workability to the fresh concrete. The quantities of cement paste and mortar necessary to achieve adequate levels of workability will depend on the amounts of sand and coarse aggregate present in the concrete, on the associated "grading" of constituent particle sizes, and on the actual level of workability required for the job. If there is insufficient mortar or cement paste, the mix will tend to be "harsh" and unworkable. Conversely, too much mortar or cement paste will promote the likelihood of "segregation" effects whereby the coarser aggregate fractions tend to separate out from the remainder of the mix. Contrary to popular belief, concrete does not set and harden through a physical drying-out process. Setting and hardening is due to a series of chemical reactions between the Portland cement and water present in the mixture; as a result of this so-called hydration process the original cement paste phase is transformed into a sort of "mineral glue" which acts to bind the sand and coarse aggregate fractions together.

II. METHODOLOGY

The increase in population and the changed lifestyle has resulted in a significant rise in the quantity of plastic waste this project in particular deals with the possibility of using the waste polyethylene as partial replacement of fine or coarse aggregate in concrete. Concrete with 2%, 4%, 6% pulverized/non pulverized polyethylene material is prepared after doing the mix design. Various tests on cement like

specific gravity, fineness, setting time, etc., tests on coarse and fine aggregates like sieve analysis, fineness modulus, specific gravity, etc. are performed. Mix design using IS Code method is done and cubes and cylinders are cast for M25 grade concrete with and without plastics and tests on concrete like slump, cube tests and cylinder tests are performed to understand their behavior and usefulness as replacement. The standard mechanical properties of concrete like compressive strength, split tensile strength are tested and compared with the results of standard specimen.

The aim of this study is to explore the possibility of re-cycling a plastic bag waste material (BBW) that is now produced in large quantities in the formulation of concrete as fine aggregate by substitution of a variable percentage of sand (10, 20, 30 and 40 %). The influence of the PBW on the fresh and hardened states properties of the concrete: workability, bulk density, ultrasonic pulse velocity testing, compressive and flexural strength of the different concretes, has been investigated and analyzed in comparison to the control concrete. The results showed that the use of PBW improves the workability and the density, reduces the compressive strength of concrete containing 10 and 20 % of waste by 10 to 24 % respectively, which have a mechanical strength acceptable for lightweight materials, remains always close to reference concrete (made without PBW). The results of this investigation consolidate the idea of the use of PBW in the field of construction, especially in the formulation of concrete.



III. CONCLUSIONS

- Shrinkage cracks work reduced in case of addition of PP in M25 mix.

- Mixing of concrete by adding PP to take less efforts as compared to conventional concrete. Cost of PP is lesser than that of conventional concrete ingredient thus reduction in cost and economic in material.
- By adding 5% PP in M25 grade concrete 7.16%. It observed as compared to conventional concrete. By adding 10% PP in M25 grade concrete 7.49%. It observed as compared to conventional concrete. By adding 15% PP in M25 grade concrete 5.93%. It observed as compared to conventional concrete.

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