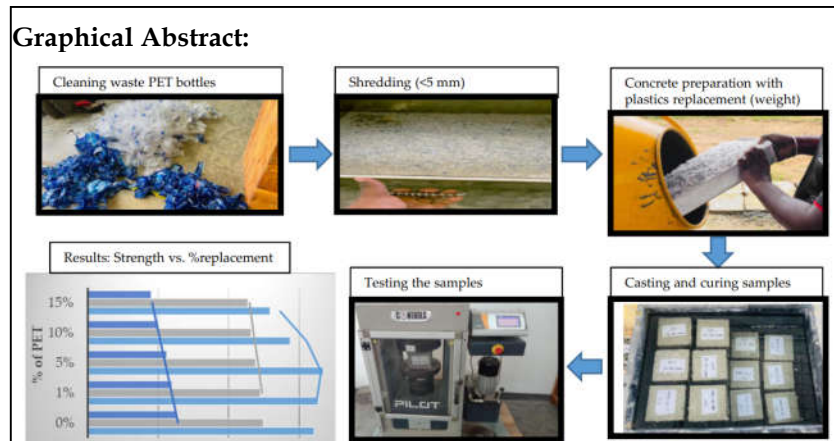


# Experimental Investigation on Compressive Strength of Plastic Waste Incorporated Concrete

W. Roopathilagan, Mohamed A. R. I. Sarfee, B. Nilakshan and M. Nithurshan\*

Department of Engineering Technology, Faculty of Technology, University of Jaffna, Ariviyal Nagar, Kilinochchi 44000, Sri Lanka.

[nithurshan@univ.jfn.ac.lk](mailto:nithurshan@univ.jfn.ac.lk)



## Abstract

Plastic pollution is massively increased all around the world due to the vast utilization of plastic in various sectors. As used plastics are being ended up in landfilling or ocean dumping without proper treatment many unpleasant effects are happening to the environment. Besides, the over-dredging of sand has been a problem in Sri Lanka for several years and is mainly fed by concrete construction. Therefore, this study focuses to find the optimum usage of plastic wastages as a partial replacement material for sand in concrete. Among the different varieties of plastics, polythene terephthalate (PET) was chosen for this study as it is being highly released to the environment after a single use. In the experimental study, six newly defined concrete mixes were obtained with a varying percentage of plastic (0 %, 1 %, 5 %, 10 % and 15 %) for a replacement of sand by weight, and six cubes were cast for each mix. Used PET plastics bottles were collected, cleaned and then shredded into finer particles (< 5 mm) for replacement material. Since workability and compressive strength are the prominent factors for measuring the quality of the concrete, slump for each mix was measured and compared with the slump of the mix with 0 % PET. Also, a compressive strength test was performed at the age of 7 days and 28 days. Based on the results, the maximum compressive strength was obtained in the 5 % replacement sample reaching 33.5 Mpa, which is 1.4 Mpa greater than the sample with 0 % PET. Furthermore, it was found that PET incorporated (5 %) concrete cube is 4.4 % lighter than the weight of the control sample. This is because the density of the PET is much less compared to river sand and there may be high voids in the PET incorporated concrete cubes due to the irregular shapes of shredded PET.

**Keywords:** compressive strength, replacement ratio, shredded plastic, workability