

Experimental Investigation on the Mechanical Properties of Printed Circuit Board (PCBs) Fibre Reinforced Concrete

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ABSTRACT

Numerous studies have been conducted to substitute the constituent materials in concrete to address the scarcity of available raw materials, and they have proven to be beneficial up to a certain point. However, in this study, we are focusing on improving the structural behaviour of concrete by incorporating printed circuit board (PCBs) fibres without substituting any constituent materials. The purpose of this work is to conduct an experimental investigation into the strength properties of concrete when printed circuit boards fibres are added after removing all the metallic components from it. The addition of PCBs fibres to concrete has many benefits, the most notable of which helps in minimising environmental pollution and waste management concerns. In this experimental work, PCBs fibres of aspect ratio (AR) of AR10 and AR20 are added at 3%, 4% and 5% for the weight of cement to the conventional concrete of Grade M40 with a water-cement ratio of 0.45. Both fresh and hardened properties of PCBs fibre reinforced concrete is tested and compared to conventional concrete. The quality of PCBs fibre reinforced concrete has also been tested by conducting UPV tests and Rebound Hammer tests. Compressive strength of PCBs fibres reinforced concrete are compared with Rebound hammer test results, both results are found to be significantly close enough. Based on the results of the tests, the discussions and conclusions are drawn. This study also discovered that repurposing hazardous electronic waste into the construction industry would aid in waste management and the prevention of environmental issues caused by electronic waste.

Keywords: *E-waste, E-waste Fiber, PCBs Fiber, Fiber-reinforced concrete, solid waste.*