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Developing a Cement Tile Using Needle Waste

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ABSTRACT

Needle waste is an unavoidable waste generated from textile industry. Since the reduced degradability, this type of waste may cause for severe environmental problems. Through this study needle waste converts into a profitable material. Moreover the study suggests an effective method to dispose needle waste and ensure the reusage of high carbon steel containing in needle waste. The study aimed to develop a profitable cement tile by utilizing needle waste. To attain this purpose, selected mechanical properties after 7 days curing and manufacturing cost of cement tile were analysed. Cement tile was manufactured by using a combination of 30% Ordinary Portland Cement (OPC), 60% river sand and 20% water. Granite powder was replaced with needle waste upto 10% by weight at a gap of 2% (i.e 0%, 2%, 4%, 6%, 8%, and 10%). Sample with 0% needle waste constitution was considered as the control. For each constitution, two replicates were tested. Then the samples were submitted to the non-destructive (water absorption) and destructive (flexural strength) testings. According to the results, the highest water absorption rate (6.27%) was recorded from control and the lowest (5.18%) was recorded from 6% needle waste constitution. Each sample contain needle waste was shown the lower water absorption value than the reference value (10%). The highest flexural strength (9.90MPa) was observed at 10% needle waste constitution and the lowest (5.93MPa) was observed at control. In here also, all constitutions of needle waste were shown higher flexural strength than reference value (5.5MPa). According to the local retail market prices in July 2021, 150×150×15 mm sized cement tile can be manufactured with 20.69% of profit than a ceramic tile. In conclusion, the utilization of needle waste in cement tiles is an innovative method to enhance the mechanical properties of cement tile with a reduced manufacturing cost.

Keywords: *Cement tile, Flexural strength, Needle waste, Profitable tile, Water absorption*