

PARTIAL REPLACEMENT OF COARSE AGGREGATE WITH PORCELAIN
GRANITE TILE WASTE (PGTW) IN REINFORCED CONCRETE BEAM

TAN WEN CHONG

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Faculty of Civil Engineering and Earth Resources
UNIVERSITI MALAYSIA PAHANG

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ABSTRACT

The demand of concrete in the construction industry increased rapidly due to the continuous development of countries around the globe. Extensive use of concrete leads to scarcity of natural aggregates. The reuse of construction waste and solid waste from manufacturing is an alternative way to preserve waste management problem as well as to reduce the depletion of natural resources. This research was conducted to investigate the flexural behaviour of partial coarse aggregate replacement with porcelain granite tile waste (PGTW) in reinforced concrete beam. In this study, PGTW was used to partially replace the coarse aggregate by 10%, 20% and 30%. All the concrete was designed to a strength of 25 N/mm² and all the specimens were cured for 7 days and 28 days. Compressive strength test was conducted to determine the compressive strength of hardened concrete. The results presented that 10% and 20% of PGTW concrete had higher compressive strength as compared to control concrete. For flexural behaviour, all the PGTW reinforced concrete beams behaved in the same way as control reinforced concrete beam in terms of load and deflection.

ABSTRAK

Permintaan konkrit dalam industri pembinaan semakin meningkat kerana pembangunan yang berterusan di seluruh dunia. Penggunaan berterusan ini membawa kepada kekurangan agregat semula jadi. Penggunaan semula sisa pembinaan dan sisa pepejal dari industri adalah cara alternatif untuk menguruskan masalah pengurusan sisa dan juga untuk mengurangkan penggunaan terus sumber semula jadi. Kajian ini dijalankan untuk mengkaji kelakuan lenturan rasuk bertetulang yang menggunakan konkrit dengan penggantian sisa jubin (PGTW) sebagai agregat kasar. Dalam kajian ini, PGTW digunakan untuk menggantikan sebahagian agregat kasar sebanyak 10%, 20% dan 30%. Semua konkrit direkabentuk dengan kekuatan 25 N/mm^2 dan semua spesimen diawet selama 7 hari dan 28 hari. Ujian kekuatan mampatan dijalankan untuk menentukan kekuatan mampatan konkrit keras. Keputusan menunjukkan bahawa 10% dan 20% gantian PGTW dalam konkrit mempunyai kekuatan mampatan yang lebih tinggi berbanding konkrit kawalan. Bagi kelakuan lenturan semua rasuk PGTW bertetulang, didapati hubungan antara beban dan pesongan setiap rasuk tidak mempunyai perbezaan yang ketara dengan rasuk bertetulang yang menggunakan konkrit kawalan.