Editorial

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The October 2011 issue of *Construction Materials* contains three papers dealing with the recycling of waste for use as a building material while the fourth paper deals with refurbishment of existing precast prestressed concrete beams.

In the first paper Kadir and Mohajerani (2011) investigate the recycling of cigarette butts in lightweight fired clay bricks. Several trillion cigarettes are produced annually, resulting in tonnes of cigarette butt waste, a large percentage of which is littered. The slow rate of degradation of cigarette filters as well as the potential leaching of toxic chemicals trapped in the cigarette butts causes environmental concerns. The paper contains results on the effect of using cigarette butts in fired clay bricks, on the strength, density, water absorption and levels of possible leachates of heavy metals from bricks. Initial results indicate that relatively large volumes of cigarette butts can be recycled in lightweight clay-fired bricks and this volume can be increased by increasing mixing times, resulting in more uniform distribution of smaller pieces of cigarette butt fibres in the mix.

High quality natural aggregates are becoming increasingly scarce and expensive, resulting in a need for technologies that can be used to produce aggregates. The rising cost of landfilling encourages the use of waste in new construction materials while carbon trading has prompted industries to find safe, permanent storage solutions for carbon dioxide. Exposing a reactive material to carbon dioxide promotes the formation of calcium carbonate, sequestering the gas. In the second paper by Gunning *et al.* (2011) a wide range of industrial waste is formed into pellets and treated with carbon dioxide gas, causing accelerated carbonation which can reduce the permeability and enhance the strength of the manufactured aggregates. The secondary aggregate contains up to 11% of its own weight in carbon dioxide gas, which is now permanently bound as a solid mineral. The properties of the aggregate produced seem to be suitable for a wide range of applications including concrete, construction blocks and substrates for green roofs.

When alumina is produced from bauxite a highly caustic and environmentally hazardous refinery residue is produced on a large scale. Seawater is used to neutralise the bauxite refinery

residue that is currently marketed under the trade name Bauxsol. Barbhuiya *et al.* (2011) conducted an experimental investigation to evaluate the effect of Bauxsol on various properties of cement paste. The results published in this paper indicate that Bauxsol does not have any pozzolanic properties. The high alkali content results in reduced setting times and increased early age strengths, but the long-term strength is reduced. The authors conclude that up to 5% of the cement can be replaced with neutralised bauxite refinery residue without a significant reduction in strength. Possible detrimental durability effects still need to be investigated.

Composite concrete bridges, consisting of precast prestressed concrete beams keyed into cast-in-situ concrete slabs have been extensively used for both practical and economical reasons. Increased heavy vehicle mass limits, as well as new design code shear stress limits, result in existing stirrups connecting precast concrete beams to the cast-in-situ concrete overlay being theoretically inadequate to transmit the longitudinal shear. In the final paper Zanardo *et al.* (2011) present the results of an extensive testing programme where the longitudinal shear resistance of epoxy-bonded composites containing carbon-fibre reinforced polymer and glass-fibre reinforced polymer non-invasive strengthening schemes were compared to traditional steel stirrups. The test results indicate that externally added fibre reinforced polymers can be used to increase the longitudinal shear strength to acceptable serviceability and ultimate loads. Externally applied strengthening schemes also resulted in increased ductility of the failure mechanism at ultimate failure load. Fabric that requires curing temperatures as high as 80°C is less efficient than fibres embedded into a resin that can be cured at lower temperatures. The use of rigid plates for retro-fitting existing composite concrete bridges could be problematic as the irregular surfaces would require thorough surface preparation. Fibre reinforced polymer fabric can however be applied on concrete elements with any type of surface or cross-sectional geometry.

All four papers published in this issue contain original research on innovative and recycled materials or refurbishment, recycling and reuse. As such the scope of these papers is well aligned to that of *Construction Materials* and I trust the readers find the content of this issue very interesting.

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