Editorial

Chris I. Goodier PhD, MCIQB, MICT
School of Civil and Building Engineering, Loughborough University, UK

It often seems nowadays that no one in the construction industry likes using Portland cement and they are always investigating ways and means of replacing it (Goodier, 2013). Its poor environmental credentials are the main reason for this, and with so many excellent variations of cement replacements currently available, the industry has no excuse for not producing and using concrete with a much lower environmental footprint than in the past. The first three papers in this issue are excellent examples of what can be done when replacing cement with some imagination, and careful consideration and thought.

Special concretes, such as ultra high-performance concretes (UHPC) use significant proportions of cement, hence any efforts to try to reduce their reliance on Portland cement should be commended. Camiletti *et al.* (2014) investigated the effect of limestone powder as a partial replacement for cement on the early-age properties of UHPC. As might be expected, the fine limestone powder helps create a denser microstructure, thus increasing the performance and properties of the material. This helped them to reduce the cement content of UHPC while enhancing the mechanical properties – a very desirable combination.

As well as limestone powder, Kaur *et al.* (2014) investigated the influence of fly ash, metakaolin and silica fume on the flexural fatigue performance of steel-fibre-reinforced concrete, and an impressive 336 beam specimens were tested to investigate the fatigue performance of different concretes in flexure. In this investigation, however, the limestone powder did not perform the best, and the mix consisting of 70% Portland cement, 20% fly ash and 10% silica fume was recommended as the most suitable.

There was no limestone powder to be found in the third paper in this issue, but instead plenty of ground granulated blast-furnace slag (GGBS), basic oxygen slag, plasterboard gypsum and cement by-pass dust as replacements for cement, this time in paving blocks, with the advantage obviously being that the material produced needs a lower structural performance than for application in beams or as UHPC. Jalull *et al.* (2014) found that about 30% cement replacement could be achieved in comparison with current factory production in the UK without having any considerable impact on the strength and durability of the paving blocks. As well as the obvious saving in carbon dioxide emissions, effective use of these materials can also

bring economic benefits because the materials are usually categorised as waste materials. Re-use such as this reduces waste disposal costs and avoids the often complex laws and regulations relating to the safe disposal of such waste material.

Moving away from concrete, in fact moving downwards construction-wise into the ground and the earth, Price and Heath (2014), with support from the Institution of Civil Engineers through their Research and Development Fund (<http://www.ice.org.uk/topics/innovationandresearch/Research-and-Development-Enabling-Fund>), have developed a quality control kit for field application based upon the hydrometer and Atterberg limit test methods from BS 1377 (BSI, 1990). They conclude that an accurate, quantitative kit can be compiled for under £350 (US\$560), excluding labour for its construction, with a mass of 10–25 kg, values which make it attractive for use in developing and disaster areas. In addition, to make availability of this new apparatus even more widely accessible, the authors have made the details freely available online on their website (<http://www.bath.ac.uk/ace/research/cicm/low-carbon-materials/low-cost-test-kit-construction-apps.html>), for which they should be applauded.

Continuing on the subject of earth materials, the final paper in this issue investigates the optimum water content tests for earthen construction materials (Smith and Augarde, 2014). They consider and compare the accuracy and quality of various tests on different soil mixes, as well as reporting on the influence of the test operator when using the equipment.

Finally, any learned publication on construction materials should always have a place for books by Adam Neville, who for decades has been publishing the seminal book on concrete, *Properties of Concrete*, which has now sold more than half a million copies in 12 languages – not bad for a book on concrete! As Claisse reports in his review, this book brings us nicely back to the topic of carbon dioxide emissions and sustainability, but interestingly, it deliberately excludes a distinct chapter on sustainability, but instead includes two chapters on durability, as well as ‘ample coverage of cement replacement materials’.

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