

## Editorial

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It is with great pleasure that I write my first editorial as a member of the Editorial Advisory Panel of *Construction Materials*. My main area of expertise is concrete technology but I do recognise that although concrete is a ubiquitous material it is not the only construction material. Concrete still, however, features heavily in current research but the emphasis has shifted towards sustainability related issues. There has been increasing concern shown in recent years over how our activities affect the environment. Cement production is said to contribute 5% of the world's total carbon dioxide emissions. This figure is likely to rise with the increased demand for infrastructure in developing countries. At the same time the production of concrete requires large volumes of raw materials most of which are quarried. It is therefore important that we consider reducing our reliance on quarried materials by seeking secondary materials that are either recycled from concrete itself or that are even derived from suitable waste streams that would otherwise be sent to landfill. It is essential, however, that we fully investigate such recycled materials for their short- and long-term effects on concrete construction before their widespread adoption by industry. Durable concrete structures are required for a sustainable built environment. We therefore need to improve our understanding of how we can increase the design life of structures through selection of appropriate materials or through better understanding of how inadvertent factors such as early-age loading in situ can affect their long-term behaviour.

It is interesting to note that structural materials are not the only ones required for the construction of a building. Natural stone is such a material and its use in facades seems to be increasing. Aesthetically pleasing it may be but we need to ensure, as with the rest of the structure, that it is used safely and that it will not fail in its function through inadvertent causes arising from its installation process or inherent causes arising from the variability in its mechanical properties.

The first paper in this issue (Ayan *et al.*, 2013) deals with the effect of water absorption, especially that of recycled aggregate, on the frost heave potential of highway pavements. The measured relationships have increased our understanding of the behaviour of road sub-base materials containing different fractions of recycled aggregate. It is encouraging that the frost heave potential was not adversely affected despite the high

water absorption values of recycled aggregate. They therefore could still be classified as non-frost susceptible.

The use of materials available from local waste streams to drive down cost and also help reduce our reliance on newly quarried aggregate is the topic of Dinakar's (2013) paper. Most of us know well that pulverised fuel ash is used extensively in concrete. However, despite this use a considerable amount is still sent to landfill. The amount of a few million tonnes going to lagoons every year in the UK seems miniscule compared to the 85 million t left unused in India every year. Manufacture of lightweight aggregates from pulverised fuel ash and their subsequent use to replace newly quarried aggregate is a sensible and sustainable proposition considering the advantages of such concretes in reducing the dead weight of structures.

Concrete structures, such as bridges, pavements and off-shore structures, are normally subjected to millions of cycles of repetitive loads making fatigue strength a critical parameter in their design. It is reassuring to know that in addition to the advantage of self-compacting concrete's ease of placement, with or without steel fibres, in structures such as bridges, pavement slabs and rapid transport systems results also suggest better fatigue performance (Goel *et al.*, 2013).

How early-age loading of concrete affects its long-term behaviour is the topic of Claisse and Dean's (2013) paper, which reports that reloads between 70 and 90% of the ultimate concrete compressive strength between 1 and 7 days did not have a detrimental long-term effect.

The topic of the next paper is natural stone. Camposinhos (2013) investigates the use of natural stone in façade systems and uses finite-element analysis techniques to predict in-service stresses on the stone in order to avoid failures.

The last paper (Gross *et al.*, 2013) looks at the use of hemp-lime as solid wall insulation in conjunction with structural timber studwork. Hemp-lime is an insulating material with low carbon footprint since it is produced from sustainable natural sources. The work described also demonstrates that there is a compressive load enhancement provided to timber studs by their encasement in hemp-lime.

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The issue closes with reviews of a trilogy of reports looking at the durability of asphalt mixtures.

#### REFERENCES

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