Editorial

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This is both an exciting and challenging time to be working with construction materials. While designers and builders have at their disposal a far greater range of products than at any other time in history, understanding the short- and long-term performance of these various materials, as well as their environmental, societal and economic impacts, is key to the delivery of a more sustainable future for humanity. Engineers now widely recognise the need for more sustainable solutions in their selection of materials and products; sufficient knowledge and understanding to deliver an optimal solution is often lacking, however. Research and development will therefore always play an essential role in the delivery of more sustainable infrastructure. Research dissemination is essential for feedback, uptake and future development. In this October issue of *Construction Materials* it is particularly pleasing to see the breadth of materials, applications and approaches in the industry represented in the four papers and two book reviews reproduced here.

The UK construction industry has relied on imported timber for centuries. While timber is increasingly used for external cladding on low- and medium-rise buildings, concerns about the supply-chain integrity and transportation impact of overseas-sourced timber are often cited by other sectors of the construction industry. Researchers at the Forest Products Research Institute at Edinburgh Napier University are working to develop greater use of UK-grown timber in higher value applications such as cladding. In this issue Davies *et al.* (2012) presents a study developing the use of UK-grown Sitka spruce for external cladding through exposure trials. Despite the large quantities available in the UK, the suitability of Sitka spruce for external cladding is not well understood. Their study aims to answer two related questions: 'How wet do timber facades get?' and 'How does the moisture content affect their performance?' Davies *et al.*'s essential study presents the answers both these questions and in doing so gives recommendations for practitioners that should enable wider exploitation of UK-grown Sitka spruce for external cladding.

A natural stone floor is one of the highest quality finishes available for builders. As such they are used in a wide variety of applications, and in their normal use may be used in either a dry or wet state. The slip resistance of natural stone floors for pedestrian traffic is a very important performance characteristic. Slip resistance is measured using standard test methods

and a variety of different surface treatments are available to improve slip resistance. In this issue Sariisik *et al.* (2012) report on their experimental study of barefoot slip resistance of Turkish natural limestone flooring materials. They compare three different surface treatments (polish, honing and tumbling) with six different limestone types. In conclusion, floor slip resistance is shown to be complex interaction between surface roughness, plate size, characteristics of the abrasives and the properties of the natural stone. This understanding will help improve future specification and performance of natural limestone floors.

Improving thermal insulation levels have seen building external envelope thicknesses increase substantially over recent years. Development of reliable thin insulation systems therefore has many attractions for new and retrofitting applications. In the third paper of this issue, Ogden *et al.* (2012), reviews the latest work on the application of thin multi-foil products for thermal insulation applications. The products have developed to limit heat transfer, in particular heat transfer by radiation, through a thin multi-layer structure of reflective outer foils and inner foam or wadding insulation layers. This review paper aims to address concerns over disagreements in the thermal performance claims of different products reported by various independent tests and claims by the manufacturers. The lack of a standard agreed test methodology for the systems has given rise to variation in reported performance. From the review it is clear that multi-foil insulation does not out-perform 200 mm thick mineral wool, which is in contrast to claims made by some multi-foil manufacturers. While hot-box and hot-plate testing methods for thermal conductivity are applicable, Ogden *et al.* (2012) argue that there is scope for development of a reliable in situ test method. As generally buildings under test often fail to meet design performance specifications, a greater acceptance and standardisation of in situ testing methods would also be a welcome wider development.

The construction industry is a major user of the Earth's natural resources, with roads a significant asset in all countries. Recycling materials minimises waste and reduces consumption of primary natural resources. In their paper Olisanwendu *et al.* (2012) consider the use of recycled materials in road construction. They argue that the selection and design of recycled and secondary materials for road construction should be based on

an appraisal founded on materials science. They develop a novel categorisation and appraisal system for material selection for sustainable road construction. Their appraisal applies materials science thinking in the field of road engineering, to develop consistent performance criteria for road materials and address concerns about the variable nature of recycled materials. This has been achieved through a review of materials, structures and performance to develop an appraisal for recycled materials in roads. Their model uses broad fundamental material types (ceramic-type, metallic-type and polymeric-type), and a systematic step-by-step procedure to provide advice on constituents and behavioural properties, which can be linked to road performance. This approach is expected to reduce complexity in understanding material properties and as such has interesting potential applications in other fields of construction.

The *Delamination Behaviour of Composites*, edited by Srinivasan Sridharan, is reviewed by Ian Sims. Over 25 chapters this authoritative work covers basic science of delamination, testing and detection of delamination, analysis and modelling. Essential reading it seems for engineers working with a range of composites and composite structures. *Geomaterials under the Microscope* by J. P. Ingham is reviewed

by Alan Poole. A fundamental understanding of materials is increasingly important to engineers and as such this book is likely to be of interest as a reference to many engineers working with geological based materials.

REFERENCES

- Davies I, Fairfield C, Stupart A and Wilson P (2012) Moisture conditions in timber cladding: field trial data for Sitka spruce. *Proceedings of the Institution of Civil Engineers – Construction Materials* **165**(5): 263–278, <http://dx.doi.org/10.1680/coma.11.00033>.
- Ogden R, Wang X, Walliman N and Kendrick C (2012) Use of multi-foil insulation in buildings: a review. *Proceedings of the Institution of Civil Engineers – Construction Materials* **165**(5): 309–320, <http://dx.doi.org/10.1680/coma.10.00048>.
- Ogwuda OI, Fordyce D and Oduyemi K (2012) Materials science appraisal for recycling materials in roads. *Proceedings of the Institution of Civil Engineers – Construction Materials* **165**(5): 297–308, <http://dx.doi.org/10.1680/coma.10.00043>.
- Sariisik A, Sariisik G and Akdaş H (2012) Slip analysis of surface-processed limestones. *Proceedings of the Institution of Civil Engineers – Construction Materials* **165**(5): 279–296, <http://dx.doi.org/10.1680/coma.10.00062>.