Editorial

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Readers of this journal will be aware of the fabulous scope of its subject, ranging from unprocessed natural soils, aggregates and rocks, right through to highly researched and engineered materials and their proprietary variants. Then there are the complicated ways in which these various materials are used together, either as composite or elemental products, or somewhere and somehow within the whole construction process, ranging perhaps from a humble wall through ever more complex buildings and on to mighty civil engineering projects. Each one of these materials and their combinations has its own inventory of properties and history of potential issues that will be of vital importance for those extending, maintaining or restoring our built environment and infrastructure.

This diversity in construction materials means that there are various entry points for would-be specialists and few people train directly for that role. A major and important starting point for many involved with construction materials is the 'university of life', getting up close and personal with various materials on building sites and often developing impressive application skills; I never cease to be amazed, for example, by the near-impossible (for me), rapid and quality achievements of good brick layers and plasterers. Increasingly, however, those dealing with construction materials have started their career in another direction, such as architecture, engineering or various science disciplines (materials, chemistry, physics, geology, etc.). In the case of materials used and maintained in historic buildings, expert practitioners have often developed from more academic beginnings, such as studying classics or ancient history.

Such varied backgrounds can lead to effective teamwork, as different but complementary specialists work together to solve problems that can arise during construction or otherwise sometimes affect buildings or other projects subsequently during their service life. In its small way, my own career has benefited from such a varied and unplanned path. Initially, I was involved with archaeological excavation for nearly a decade and assumed I might be an archaeologist. However, in the end I graduated in geology and had generated a particular interest in its applied branch. This led to research in concrete technology and a life in construction materials consultancy. As befitted my varied background, my main claims to expertise

became historic materials, geomaterials such as aggregates and building stone, and a whole range of concrete and other cementitious materials.

Occasionally these sectors of my career can converge on a single issue. I recently attended a meeting to mark 50 years since the discovery (or more properly, rediscovery) of a particularly fine mosaic floor at Sparsholt Roman Villa in Hampshire (Johnston and Dicks, 2014), when my role was to move a vote of thanks to the speaker, an expert in Roman mosaics and mosaicists. We heard about the complex geometrical design of the mosaic and the highly skilled way in which the mosaicist had selected and used the tessellae, variously comprising different natural stone types. My contribution to the following discussion was to explain why this mosaic floor had survived in such a flat and largely undamaged way (the floor can be viewed in Winchester City Museum). This mosaic had been part of the third (and final) floor finish in the reception room in question, representing a distinct embellishment, and it had the good fortune to have been laid on to the previous (second) floor, which was made of dense, thoroughly mixed and well compacted Roman concrete.

The contents of this issue of *Construction Materials* also comprise stimulating and useful information on concrete, albeit of the modern variety, and related products, including three Briefings and two Papers on concrete and composites.

There is sometimes a need to investigate the details of a concrete mix in its hardened condition, perhaps in order to understand an older (even historic) concrete when it is being assessed for continued use and/or conservation within a structure, or occasionally because a question has arisen in connection with recently placed material. Since 1989, the principal guidance on such an analysis of hardened concrete has been *Concrete Society Technical Report 32* (Concrete Society, 1989), which was based on earlier ground-breaking UK research and the resultant British Standard methods. In the first Briefing, Ingham and Barnes (2015) describe the work of a Concrete Society working group (the authors were Chairman and Secretary, respectively) that was set up to update *Concrete Society Technical Report 32*, the resultant second edition of which was published last year (Concrete Society, 2014; see also

the Book review by Sims (2015) at the end of this issue). In particular, the authors explain that new trials were undertaken for the various British Standard tests, especially in view of the greater complexity of modern concrete mixes, and that the findings raised questions over the accuracy of the existing methods.

In the second Briefing, three of the participants in the *Concrete Society Technical Report 32* working group and trials, Crofts, Jasko and Mayers (2015), explain that the trials had some recognised shortcomings that might have adversely affected the outcomes, and describe proposals for new trials that are currently being planned.

Fibre reinforcement of concrete and other composites, using a variety of fibre types including natural, steel, glass and various polymeric materials, is becoming quite a common measure for seeking to enhance physical and mechanical properties and/or to gain economic benefits. Three papers on this subject are included in this issue, two of which consider engineering performance while the other addresses environmental issues.

Firstly, Arunachalam and Jayakumar (2015) highlight the influence of polypropylene fibres on the mechanical properties of high-performance concrete that also contains silica fume. In their limited programme, they found that the addition of polypropylene fibres increased compressive, tensile and flexural strengths, whilst having little effect on workability, and that the enhancement was better achieved by the lower fibre contents tested.

Secondly, Ghosh, Bhattacharjya and Chakraborty (2015) address the behaviour of short-fibre-reinforced concrete in bending shear, explaining that most previous work has focused on just tensile and flexural strength. They briefly describe their proposed model for predicting the stress-strain history and their experiments using steel fibre reinforcement for validating the approach and findings.

The final paper in this issue by Zhang (2015) considers the potential environmental impacts of using fibre-reinforced polymer composites, which are particularly used for bridge engineering. The author presents a literature review on various aspects and two life-cycle analysis case studies (one in the Netherlands and the other in the UK). While further work is recommended and outlined, it was found that fibre-reinforced polymers can be environmentally competitive.

It is hoped that readers will enjoy reading these Briefings and Papers, and find them useful in practice. Finally, it is my great pleasure to send everyone seasonal greetings.

References

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