Cite this article
Bassuoni MT (2022)
Editorial.
Proceedings of the Institution of Civil Engineers – Construction Materials **175(5)**: 197,
https://doi.org/10.1680/jcoma.2022.175.5.197

Construction Materials

ice Publishing

Editorial

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The worldwide deficit to deal with deteriorating infrastructure remains a challenging task for policy makers, researchers, practitioners and the public. Cement-based materials are indispensable for restoring/building vital infrastructure (transportation networks, sewage systems, buildings etc.) required for sustaining economic growth and quality of life. This demand, however, should be balanced with viable sustainability practices in the construction industry considering ecological challenges such as depleting natural resources and climate change. Therefore, the contributions in this issue employ materials engineering principles to design, develop and test sustainable construction materials.

The first paper is from India, by Patel *et al*. (2022), and focused on the use of industrial by-products (fly ash and copper slag) mixed with cement or lime as a base construction material for flexible pavements. This aligns with the continual research efforts towards introducing sustainable construction materials with reduced 'carbon footprints'. Experimental and modelling trends showed that it is possible to exploit such blended binders to extend the service life of flexible pavements up to 78% compared to a base material of wet-mix macadam.

The second contribution, from the USA by Brown *et al*. (2022), responds to a very important question often raised by the construction industry concerning the variation of concrete compressive strength. This topic is particularly important to quality control/assurance of concrete produced from cementitious materials obtained from various sources. The work analysed numerous data sets for concrete mixes including different types of cement (ordinary Portland cement, Portland limestone cement) and supplementary cementitious materials (SCMs: fly ash and slag). Statistical analysis for the compressive strength of these mixes at different ages showed that there are large coefficients of variation when changing the cement source, especially for mixes incorporating SCMs. While these conclusions are limited to the population of data mined and materials used, the merit of this paper lies in highlighting the challenges faced by the concrete industry with respect to changing the sources of materials.

The third contribution, from Australia by Kohees *et al*. (2022), reports on experimental work regarding the stress–strain behaviour of normal-strength cement paste under triaxial stresses. Different confining pressures were used to analyse the stress–strain behaviour of cement paste, which was used to develop a simple equation for the strain at peak compressive stress. Using the first principles of materials engineering and solid mechanics, a stress–strain model was introduced, which agreed well with the experimental results. Thus, it was concluded that this model might have a good generalisation capacity to predict the behaviour of cement pastes under different states of stress.

The three papers provide the readers of this journal with a blend of engineering and scientific topics, which are of equal importance to academic researchers and industry practitioners. The first two papers combine sustainability with industrial practices and challenges, while the third one focuses on fundamental engineering principles. I hope that you enjoy navigating through these papers with beneficial insights to your work practices.

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