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Editorial

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Editorial

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For the record, this editorial was written in what are unusual times. A viral pandemic is sweeping across the globe, with Europe particularly hard hit at the current time. The UK is in a lockdown and, other than key workers, much of the UK population is restricted to working from home. Large numbers of construction projects have been suspended and we are facing long-term effects that may be unprecedented in their impact.

Yet despite this there is an attempt for things to carry on as normally as they can. Work is being carried out remotely where possible. With people working from home, there is a demand on aspects of our infrastructure that has not previously been tested. Furthermore, we can see that our buildings and particularly our homes are vital for protecting us and isolating us. Whilst we have always required safe, warm and secure houses, perhaps that has never been more apparent than now. Although our day-to-day focus may be on health, food supply, refuse collection, let's not forget that our civil infrastructure remains vital to providing these needs. Indeed, we have seen large hospitals rapidly constructed in recent days to house the growing number of patients, and the technical expertise of civil engineers utilised to help the health services deliver clinical care.

This edition of *Construction Materials* contains four papers. The first two papers cover asphalt and particularly issues relating to fatigue micro-cracking resulting from repetitive loading at a level below the ultimate strength of the pavement. This type of repetitive loading is common in normal circumstances – although, for reasons stated above, our road network is getting a degree of rest at the current time. Of course, fatigue cracking has been much studied in the past, but we do know that various differences in performance that have been reported might be due to the test methods used rather than the material itself. To address this aspect of performance, Ahmed *et al.* (2020) have used a degradation-based modelling approach to evaluate and predict the fatigue performance of hot-mix asphalt (HMA) regardless of test method. Initial results are promising but further work is required to develop a constitutive model for predicting overall fatigue performance.

Cracking of asphalt is also the basis for our second paper, where Notani and Mokhtarnejad (2020) have investigated the use of used printer toner to modify asphalt binders and

provide them with improved self-healing capability. Significant quantities of toner are produced annually by the printing and copying industries and its use in construction materials such as asphalt and concrete (Newlands *et al.*, 2019) contribute to the circular economy.

The research has shown that the addition of toner to asphalt alters the visco-elastic properties, giving it initially improved resistance to rutting and then later the oil phase in the toner assists with self-healing. Whilst technologically interesting, further work is required to address potential concerns relating to leaching of undesirable species into the environment from the toner-enhanced asphalt during operation.

Our third paper looks at the development of sustainable bricks using ash recovered from co-combustion of sawdust and coal (Pradhan *et al.*, 2020). The bricks produced were determined to be less dense, less thermally conductive and have lower embodied energy than conventional bricks made using coal-based fly-ash. However, strength was severely compromised and water absorption of the bricks was substantially higher. In essence, the sawdust, which was reported to contain crystalline silica, is unreactive and acts simply as an inert filler. Whilst this use of sawdust ash may contribute to the circular economy, there is still perhaps a need to find a conduit for these lower-quality bricks in construction.

The final paper describes a study to simulate the failure process of fibre-reinforced polymer (FRP)-confined high-strength concrete using a two-dimensional mesoscopic model (Payab *et al.*, 2020). The model is interesting in the way that it models aggregate fracture during failure of high-strength concrete. It is well known, although not fully understood, that high-strength concrete fails by splitting of the aggregates rather than by separation of the interfacial transitional zone (mortar-aggregate) and the model goes some way to explaining the phenomenon that occurs. However, again it is clear that more research is needed.

This issue has provided insights into exciting research currently underway in India, Iran and Iraq. However, it is clear in all four cases that further research is needed before these materials and methods can be used in construction. I hope that even in these

uncertain times this issue has provided you with food for thought and has generated inspiration for further research. Stay safe!

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