Editorial

Jennifer Murgatroyd DPhil (Oxon)

Senior Geomaterials Scientist – Historic Materials Specialist, Materials and Structures Department, RSK Group Limited, Helsby, UK

Welcome to this special edition of *Construction Materials*, which turns its focus specifically to historic materials. With this issue we hope to illustrate the value of inspecting and documenting older building materials. Heritage structures are at their most valuable to us when they remain in use, but we can only know what to do next if we properly understand what came before. Whether still in use or at the end of their service-life, historic materials hold a wealth of useful information that stretch beyond strictly historical concerns. Although interesting in their own right, details like the original material selection or architectural design are perhaps most useful in the context of sustainability and refurbishment.

In order to make appropriate plans for extending the service life of a historic structure, it is important to establish a full inventory of the original materials and a good understanding of how they have fared with time. In our first paper, Kirkpatrick (2018) details the complexity of investigating historic structures under challenging circumstances when complete records of a structure's history are not available. The efforts required to complete the investigation of a historic concrete quay in Scotland were put to good use in the design of remedial works. In a second example of complex material investigations, Holowaty (2018) presents surprising results of composition analysis of the steel used in historic bridges in Poland. Here again, an investigation into the original materials has directly informed the final strategy for structural maintenance and retrofitting.

In some cases, we actually do have good record kept by previous generations of engineers who foresaw the value of testing and documentation. Legacy datasets can be invaluable resources when we seek to understand the mechanical properties of construction materials and their performance. We have two examples of novel uses of old data used experimentally as an alternative to difficult, invasive material testing. Take for instance, our third paper, which offers the look back at the

strength classifications of Australian hardwood used in timber bridges in Australia by Moore and Glencross-Grant (2018). The authors used historic data of strength classifications of hardwoods as a baseline for gauging later changes in strength, resulting in an interesting discussion of how mechanical values of the timbers can be affected by aging. Another example is Fantilli *et al.*'s (2018) study of concrete strength, which uses mathematical modelling to predict the current strength of undamaged concrete based on validated compressive strength data from historical databases. Food for thought, when one considers the quantity of similar data currently generated every year by test houses worldwide.

We can take a lesson from these old datasets, perhaps even more so from the gaps in the record, by collecting and collating data now from so-called modern materials. Perhaps it should be considered good practice to evaluate the performance of relatively modern construction materials as they age in real time. Every new technology will eventually become a historic technique, and later generations will thank us for keeping good notes. One such example is our final paper, in which Gates *et al.* (2018) investigate a decidedly modern composite cladding material, opportunistically sourced from a demolition site. Their results have revealed aspects of age-related degradation and a specific environmental factor that could affect the long-term performance. This will no doubt will come in handy to future engineers looking to explain similar problems.

The papers presented in this special themed issue represent, ironically enough, a look at the future of historic materials. Structures built with concrete and steel are beginning to age into the heritage sector alongside their lime and timber counterparts. We have reached a point when building control standards have been regulated for long enough that the early records themselves are valuable historic documents, and the wealth of data can only get richer from here. It is an exciting time when the same techniques normally used for quality

control studies of active new-builds can be applied to the investigation of historic materials. Hopefully the structures we work to conserve now and the new structures we place alongside them will remain equally valuable to those that follow on from us.

Readers who enjoy this special edition should seek out *Engineering Heritage and History*, also published by ICE, which covers a broad range of issues related to the investigation of historic structures from around the world.

REFERENCES

- Fantilli AP, Frigo B and Chiaia B (2018) A simplified approach to the evaluation of the strength of old concret. *Proceedings of the Institution of Civil Engineers – Construction Materials* **171(6)**: 257–266, <https://doi.org/10.1680/jcoma.17.00010>.
- Gates P, Ibell T, Darby A and Evernden M (2018) GFRP durability appraisal: mechanical testing of naturally aged composite panels. *Proceedings of the Institution of Civil Engineers – Construction Materials* **171(6)**: 267–283, <https://doi.org/10.1680/jcoma.17.00023>.
- Holowaty J (2018) Properties of high tensile steels in historical railway bridges. *Proceedings of the Institution of Civil Engineers – Construction Materials* **171(6)**: 234–245, <https://doi.org/10.1680/jcoma.17.00012>.
- Kirkpatrick M (2018) Appraisal of historical maritime structures at Clydebank, Scotland. *Proceedings of the Institution of Civil Engineers – Construction Materials* **171(6)**: 225–233, <https://doi.org/10.1680/jcoma.17.00011>.
- Moore JC and Glencross-Grant R (2018) Characterising native hardwood timber bridges in New South Wales, Australia. *Proceedings of the Institution of Civil Engineers – Construction Materials* **171(6)**: 246–256, <https://doi.org/10.1680/jcoma.17.00014>.