



# Performance based testing and assessment of reinforced concrete



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## Summary

This multi-year UK Government funded project highlights the development of an innovative, non-destructive concrete testing methodology for assessing the durability performance of concrete structures exposed to aggressive chloride environments. It concerns the application of electrical response and properties of concrete and shows how these properties can be used to predict the long-term performance of concrete. Project outcomes show that the testing methodology can be exploited as a pre-qualification test at the mix design stage (prior to concreting operations) and be applied to the same cube/cylinder samples that are currently used for the compressive strength testing in the laboratory setting. The same testing methodology can also be applied on site to in-situ concrete during construction; for example, to ensure that the concrete, as delivered, is the same as the pre-qualified concrete. This testing methodology is currently undergoing a renaissance in many parts of the world including the European Union, Canada, The United States and Japan.

Dubai, as the largest coastal city in the United Arab Emirates, provides an ideal place to exploit the capability of this smart concrete testing technology, given the concomitant presence of the hot and humid climatic conditions and high levels of chlorides from the Persian Gulf. Technology implementation will therefore provide a unique opportunity to revolutionise the construction industry in the Gulf region and consolidate Dubai's position as a leading global centre in smart concrete technologies.

Part of developments in the testing methodologies has been installed in a remote interrogation system at our marine test site on the Dornoch Firth in Scotland.



## Publications

McCarter, W.J., Suryanto, B., Taha, H.M., Nanukuttan, S. and Basheer, P.M., 2017. A testing methodology for performance-based specification. *J. Structural Integrity and Maintenance*, 2(2), pp.78-88.

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<https://doi.org/10.1016/j.conbuildmat.2018.10.151>.
- Suryanto, B., Kim, J., McCarter, W.J., Starrs, G. and Aitken, M.W., 2020. Assessing the performance and transport properties of concrete using electrical property measurements. *Journal of Advanced Concrete Technology* (accepted for publication).