Book review

Short Guide 5: Historic Concrete in Scotland – Parts 1–3

Denis Urquhart. Historic Scotland National Conservation Centre, Edinburgh, UK, 2013 and 2014, ISBN 978-1-84917-119-9, £0-00, 36 pp.; ISBN 978-1-84917-166-3, £0-00, 28 pp.; ISBN 978-1-84917-167-0, £0-00, 36 pp.

Concrete has been used as a building material for at least seven to eight millennia. Its earliest evidence can be traced back to the Nabataeans, who constructed concrete-like structures around 6500 BC. The earliest evidence of concrete in Europe was found at Lepenski Vir on the Balkan Peninsula and dates back to 5600 BC. Since then, concrete has undergone continuous development. It has become more widely used since 3000 BC, with probably the most famous concrete structure from ancient times being the Pantheon in Rome, built in AD 120 by using pozzolanic concrete. The next significant step in the development of concrete was not before the beginning of the nineteenth century, when Portland cement was first patented by Joseph Aspdin in 1824. He created the first mass-produced and widely accepted artificial cement. The basic recipe of Portland cement has remained largely unchanged until the present day and forms the basis of most concrete and hydraulic mortar.

Reinforced concrete, as it is known today, appeared in the late 1840s, when Joseph-Louis Lambot built the oldest known boat by using ferro-cement and Joseph Monier, a gardener from Paris, reinforced garden pots with an iron mesh and later promoted the use of reinforced concrete for pipes, floors, arches and bridges. Reinforced concrete was, however, not patented until 1867.

Short Guide 5: Historic Concrete in Scotland provides an overview of the history and historic significance of concrete in Scotland. In its three parts, it briefly discusses methods of concrete investigation and assessment and the conservation of concrete for future generations.

Part 1 of the guide provides information on the history and development of concrete as a material and how it has been used since the middle of the nineteenth century. The guide provides a wide range of examples of structures where different types of concrete were utilised and the associated challenges that may be encountered due to the lack of codes of practice and guidance at the time of construction.

Part 2 provides an overview of types of concrete defects and decay that can be observed in historic structures and discusses investigation and assessment

methods in more depth. The overview of the concrete defects and their causes has been carried out on a high level without providing much depth. The description of the causes of deterioration may suggest a lack of detailed understanding of the mechanisms; this, however, does not undermine the value of this short guide. The investigation and assessment section provides an excellent summary of the various techniques available to engineers.

Part 3 focuses on the maintenance and repair aspects that are relevant and available for concrete structures. It includes an excellent discussion of the conventional maintenance and repair methods of conserving historic structures, and it also gives an overview of more recent methods, such as electrochemical techniques, of conserving concrete structures. The description of electrochemical techniques was found to lack some understanding of the principles of corrosion protection. However, it provides a well-composed summary of the various techniques and their implications on historic structures.

The guide includes various illustrations of typical concrete structures and examples of defects as well as good and bad repairs. Each section has an excellent summary highlighting the most relevant points, and the diagrams and tables are also well presented.

The short guide provides an excellent overview of historic concrete, the issues that may arise and methods that are available for maintaining structures of historic interest. As the author states in the introduction, 'The primary focus ... is on the historical development and use of concrete in Scotland between 1840 and 1945, and the background to its conservation and repair highlighting indicative examples and techniques'. The guide does 'not seek to be the sum of total knowledge on the subject, rather an overview to those new to aspects of building conservation. More detailed information is available, especially in the well established area of concrete repair'. The reviewer agrees with the recommendation in the introductory notes and encourages readers wishing to understand concrete deterioration fully to consult, along with this book, more detailed literature on deterioration mechanisms and established guidance on concrete repair methods.

Rene Brueckner