

## Book review

### **CORROSION OF STEEL IN CONCRETE – UNDERSTANDING, INVESTIGATION AND REPAIR 2ND EDN**

J. P. Broomfield, Taylor & Francis, London, 2006, ISBN 978-0-4153-3404-4, £79.00, 296 pp.

One hundred years ago Knudson<sup>1</sup> showed that the passage of a small current through the reinforcement in concrete would cause corrosion. His opinion that stray currents were the cause of the problem was shared by most researchers at the time but within a few years Rosa *et al.*<sup>2</sup> had concluded that 'the presence of chlorides always facilitated trouble'. In this book John Broomfield brings the reader right up to date with the latest solutions to the problem and the codes and standards that relate to them.

At the outset it must be stated that this is not a book for the theoretician. It is practical throughout and makes no attempt to discuss the basic science, covering only those aspects of the application of it which are necessary for the practitioner. It should also be noted that this is fundamentally a reference book with some comments being repeated under different headings in order to make the discussion of the topic complete in itself.

After the introduction, chapter 2 covers the theory of corrosion in just nine pages before moving on to an equally brief introduction to the main causes of corrosion (chlorides and carbonation) in chapter 3. The real substance of the book starts in chapter 4 with a detailed description of methods for evaluating the condition of structures. After a discussion of the background the methods are discussed under the headings: property to be measured; equipment and use; interpretation; limitations; and standards and guidance. This provides a comprehensive and valuable resource covering all of the main tests in current use. The potentiostat for linear polarisation measurements is described as a 'sophisticated development of the reference electrode', which might cause concern to some readers but scientific discussion is not the purpose of the book. An interesting discussion of corrosion monitoring (i.e. on-going evaluation) follows in chapter 5.

Repair methods are divided into three chapters covering physical and chemical repair, electrochemical repair and a discussion of rehabilitation methodologies which provides guidance on the choice of method. The discussions are comprehensive, covering all types of concrete removal, patching and coating and then cathodic protection, desalination and re-alkalisation.

Before discussing cathodic protection Broomfield states quite clearly that 'In the following discussion we do not intend to show the reader how to design a cathodic protection system from scratch'. Although he gives ample examples of real data on individual components of systems he does not include any complete case studies which might be used as a model to work from in a design. The reader is referred to a 'qualified and experienced corrosion expert' for the design of a system.

A number of largely empirical models for the progress of corrosion and deterioration are given in chapter 9 followed by the final chapters which give ideas on designing for durability and a discussion of future developments.

The book would benefit greatly from better quality pictures. Even if they were bound together on a few consecutive pages some good quality colour prints would make many of the concepts far easier to follow. The book is also unfortunately let down by inadequate proof reading. Nevertheless it is highly recommended as an essential addition to the bookshelf of every professional practice working on reinforced concrete.

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### **REFERENCES**

1. KNUDSON A. A. Electrolytic corrosion of iron and steel in concrete. *Transactions of the American Institute of Electrical Engineers*, 1907, 26, 231–245.
2. ROSA E. B., McCULLOM B. and PETERS P. S. Electrolysis of concrete. *Engineering News*, 1912, 68, 1162–1170.