Book review

INSPECTION AND MONITORING TECHNIQUES FOR BRIDGES AND CIVIL STRUCTURES

Gongkang Fu (ed.). Woodhead Publishing Limited, 2005.
ISBN-13 978 1 88573 939 0, ISBN-10 1 8557 3939 9 £30.00, 288 pp.

Rather than the reference work that the title suggests, *Inspection and Monitoring Techniques for Bridges and Civil Structures* is a collection of 12 state-of-the-art reviews, each by a different author, edited by Gongkang Fu, Professor of Structural Engineering at Wayne State University, Michigan, USA.

Chapter 1 gives a basic introduction to reinforcement corrosion. The electrochemical monitoring techniques covered include potential mapping, linear polarisation resistance, AC impedance spectroscopy, galvanostatic pulse measurement, Tafel extrapolation and the galvanic corrosion test. Physico-chemical techniques reviewed include resistivity measurement, chloride ion measurement and carbonation testing.

Chapter 2 deals with ASR. Half of the chapter provides a basic introduction to the chemistry of the reaction and to diagnostic testing techniques. The second half comprises a series of Norwegian case histories.

Chapter 3 covers a mechanised variation on hammer tapping of bridge decks. Whether this is worth an entire chapter is debatable.

Chapter 4 is devoted to the electrical impedance testing of wood. A thorough explanation of the theory is given first. Unfortunately, an explanation as to why the test is useful is left until almost the end of the chapter. This is therefore likely to remain unread by the casual reader, defeated by the preceding mathematics.

Chapters 5 and 6, respectively, describe inspection and non-destructive testing (NDT) techniques for detecting decay in wood and the longitudinal stress wave technique for the determination of timber pile lengths in bridges.

Chapter 7 covers the use of ultrasonics in testing timber components and proposes a relationship between ultrasonic pulse velocity and strength, which at one point is given the unusual units of kPa/cm^2 [sic].

Chapter 8 looks at digital radiography of timber structures and presents some American case histories.

The first part of Chapter 9 describes the history of the visual inspection of bridges in the USA and is an interesting, if lightweight, read. However, the second half of the chapter should be mandatory reading for everyone involved in commissioning and managing bridge inspections. It describes research undertaken in the USA to quantify the level of subjectivity involved in bridge inspections, and the results are quite alarming.

The book's remaining chapters are on acoustic emission, with sections on the theory and practical techniques, the use of virtual reality in bridge inspections, and discontinuities in masonry walls.

Of the 12 chapters in the book, three relate to concrete, five to timber, and there is a chapter on masonry walls. Given the American affiliation of the majority of the authors, the lack of a chapter dedicated to masonry bridges is possibly understandable but five chapters on timber is surely too many for what purports to be a general text, and not including even a single chapter on metal bridges must be considered a serious omission.

The back cover of *Inspection and Monitoring Techniques for Bridges and Civil Structures* describes it as 'an invaluable reference for ... civil engineers involved in safety inspection and the maintenance and repair of bridges and civil structures', and there are sections of real interest here. However, given the over-concentration on timber, the lack of any reference to metallic structures and the practical irrelevance of some of the content (virtual reality inspections), the book cannot be recommended as a general reference work.

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