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Book Review

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Book review

Construction Materials: Their Nature and Behaviour

M. Soutsos and P. Domone (eds). CRC Press, Boca Raton, FL, USA 2017, 5th edn, ISBN 9781498741101, £42.74, 820 pp.

First published in 1979, *Construction Materials: Their Nature and Behaviour* has evolved through five editions as a comprehensive and dynamic textbook covering fundamental principles of the materials from which our built environment is made. Addressed primarily at undergraduate students from civil engineering and related disciplines, the book adopts a holistic approach to unravel the structure-to-performance relationship of traditional materials of construction, as well as reflecting recent advances in the field. For practising engineers, architects and other stakeholders in the construction industry, the integrated approach to materials selection, encompassing concepts from performance, cost and sustainability, will prove priceless at various stages of the design of buildings and infrastructure.

This fifth edition of the book retains the astute authorship from the fourth edition but with a new lead co-editor in M. Soutsos. The authors are academics, practitioners and scientists of international reputation in engineering materials research drawn largely from UK institutions, and for the first time, P. B. Lourenço, from Portugal, has overhauled the chapters dedicated to masonry. The impressive list of authors comprises experienced teachers of the subject with many of them currently overseeing interdisciplinary and trans-national-funded research projects. Consequently, their expertise and insight into the state of the art in materials science is demonstrated throughout the revised edition.

Adopting the same format as the previous edition, the book comprises 58 chapters, organised under ten broad themes, covering virtually all materials in the supply chain of modern-day construction. The first theme appropriately considers fundamentals of matter as solid, liquid and gas, from the atomic scale, and relates these to macro-scale performance. Following this, the reader is guided to discover ternary relationships among

the structure, production and in-service performance of a range of civil engineering materials, concluding with a comprehensive appraisal of factors influencing the choice of materials in the context of project constraints.

Construction, like other sectors of the economy, needs to adopt decisive but transformational measures to mitigate the consequences of climate change and simultaneously reduce global emissions. As a result, sustainability considerations, including resource extraction, emissions, durability and recyclability, increasingly compete with functionality and the cost of infrastructure. The engineer is expected to demonstrate an understanding of these issues in order to maximise the opportunity to deliver sustainable design solutions. This concisely written textbook imparts the knowledge needed to achieve that. In parallel, emerging technologies including digital construction, design for manufacture and de-construction are gradually transitioning into practice. This book does not specifically deal with materials in the context of the above concepts. However, the basis is laid to enable appreciation of advanced materials. As an example, viscoelastic properties treated in chapter 5 underpin the recent development towards three-dimensional printable concrete.

The theme on fibre composites (Part V) represents the most significant update from the last edition. Two previously separate sections on polymer composites and fibre-reinforced cement and concrete are now unified, but retain the core information, with recent insights into fibre–matrix interfaces also incorporated. More in-depth information on confined masonry is reported in chapter 47. The inclusion of tutorial questions under the various themes is commendable and consistent with other textbooks on engineering materials.

The current edition represents an important addition to the body of literature on construction materials, as there are limited textbooks of similar scope and completeness.

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