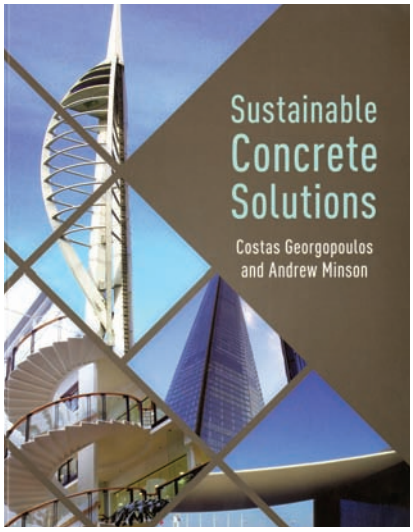
Review

Institution Fellow, Alasdair Beal, questions the lack of technical detail in this book by two concrete experts.

Sustainable Concrete Solutions



Authors: Costas Georgopoulos and Andrew Minson
Publisher: Wiley-Blackwell (John Wiley & Sons)
Price: £49.95 (paperback), £39.99 (ebook)
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This book is timely and addresses an important subject. Like many other industries, construction needs to reduce its environmental impact to create buildings that use fewer resources during construction and less energy in service. Structures should also last longer and be easier to recycle at the end of their lives. It is nicely presented and the authors are both well known for their work in this area.

According to the Foreword by Professor Jacqueline Glass, the book is for 'construction and engineering practitioners, academics and students' and is aimed particularly at practicing structural engineers. The first two chapters give an overview of the environmental issues and challenges and these are followed by chapters on conceptual design, material specification and construction, operation and demolition.

The chapters on environmental issues cover the main topics. Unfortunately, as in many other books about environmental issues written by authors linked to trade associations, we hear a lot about the environmental advantages of concrete relative to other materials but not much about other sides of the story. A more balanced treatment would be of greater interest and value.

Once an engineer has been persuaded to try to reduce the environmental impact of the buildings they design, what they need above all is the detailed information and guidance to know exactly how to do it. Unfortunately, the authors' reluctance to talk about concrete problems means that some important recycling issues are not discussed at all; such as the need for care to avoid sulphate attack on crushed concrete used as fill. There is only a general review of technical issues and construction methods – and some rather 'hit and miss' ideas. Thus we are told (p.72) that engineers often over-design foundations (do they?) but then it is acknowledged (p.73) that what researchers see as 'over-design' (i.e. base sizes not precisely matched to loads) is actually sensible rationalisation of foundation widths in the interests of practical economical construction. Similarly, we are told that basements are a good idea but surely promoting them in flood risk areas as a 'sustainability' idea (p.76) is stretching the point a bit?

For the practising structural engineer the lack of technical detail is frustrating. Structural slab efficiency is discussed but the importance of getting span/depth ratio and cover correct to minimise slab thickness is barely mentioned. On p.193 a potentially useful span/depth chart from a Concrete Centre publication is reproduced but we are not told whether the 'depth' shown is effective depth or total thickness, or whether the 'one-way' slabs are simply supported or continuous. Does a flat slab spanning 4m really need to have an effective depth (or thickness) of 200mm? We are told that pollution from making concrete is related to its cement content, but there is no detailed advice on optimising mix design for either foundations or structure. Guidance on concrete mix design and cover for durability is similarly lacking and the analysis of concrete mix optimisation for a slab (p.165) only considers grades of C32/40 and above, despite the fact that from a strength point of view C20/25 or C25/30 concrete would be ample.

Where is the guidance on correct selection of standard concrete mixes to optimise resource use while achieving satisfactory performance and good durability? Where is the discussion of concrete cover, even though excessive internal cover increases dead load and wastes material, while inadequate external cover can drastically shorten building life? More broadly, where is the discussion of design and detailing for durability - crucial for minimising resource use? Worst of all, attention is focused solely on new construction but where is the discussion of repair, alteration and renovation of existing concrete structures, which can lead to dramatic resource savings?

As a broad discussion of the issues, this book has some interest but ultimately the lack of detailed technical discussion and guidance limits its value to practicing engineers.

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