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Book review
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Book review

Structural Engineering Failures: Lessons for Design

Niall F. MacAlevey. Createspace, LaVergne, TN, USA, 2010, ISBN 978-145-374-5779, **£20.89, 286 pp.**

To start a review of this book, which succinctly presents the failure and lessons drawn from 50 case studies of civil engineering structures throughout the world, it is appropriate to quote from Dr MacAlevey's preface:

> Collapse is every structural engineer's biggest fear. Fortunately not every engineer must go through the experience of a collapse first-hand: we can all learn from the mistakes of others. In fact, it has been said that the only way in which we can prevent structural engineering failures is by more education. This is the purpose of this book.
> We can learn from structural engineering successes, as these structures are not tested. Structural failures, on the other hand, are full-scale tests. If something goes wrong it is essential that the failures are studied so that the true circumstances of the failure (and thus the nature of the test) are established so that we can learn what not to do next time.

In the introductory chapter, the author gives the reason for failures and here, and throughout the book, develops the fact that total collapses occur most frequently during construction. Chapter 1 further summarises what is progressive collapse, ductile and brittle failure, statical determinacy, code approach and tied solution. The bulk of the book, comprising chapters 2 to 10, is devoted to 50 collapse failures: 42 of these case studies have been neatly grouped into eight chapters on a particular topic. The divisions are arbitrary and purely for organisational reasons. There is a chapter each on: gravity (with four case studies); computers and modelling (again, four studies); wind (five examples); maintenance (seven); welding (four); construction (seven); and fire, explosion and impact (a further seven case studies). With eight of the case studies not belonging to any of these topic groupings, chapter 10 covers miscellaneous failures. Following the final concluding chapter, MacAlevey presents work examples by way of 21 quiz questions and model answers. Although these examples are independent of the case studies, they do reinforce a number of lessons drawn out by the author from his critical evaluation of them.

To emphasise key messages that will educate the reader, Dr MacAlevey has, throughout the book, intelligently used quotes from several prominent professionals. He has minimised the word count and number of line drawings (there are no photographs) needed to convey the important facts on a failure. He has used his expertise and experience, both as an academic and practitioner, to draw lessons that each of the 50 case studies can offer. Information on the case studies has been extracted from some 120 references, which provide a comprehensive source of publications on structural engineering failures. A weakness is that only secondary sources are cited. Few of the original investigation reports are quoted sources, and so it is possible that facts have either been diluted or even mislaid. The book is self-published, and there are a fair number of minor typographical mistakes and the style of writing is occasionally not to normal convention. Editorial support would have given guidance on the need to avoid uncommon terminology and for more words to integrate a figure's content into the text. Despite these shortcomings, the content has very good educational value and most of the material is going to be accessible to the reader who has reached year 2 education on a UK undergraduate course.

Dr MacAlevey successfully directs the lessons learnt towards encouraging professional engineers to:

- design structures that are more resistant to collapse
- avoid making the mistakes made by engineers in the past
- see the importance and limitations of checking and of codes of practice
- be aware of danger signals
- see how preventable failures are
- learn more about engineering judgement
- encourage a more reflective approach among designers so they do not just apply codes blindly
- see the relationship between analysis and design.

Given the importance of not repeating mistakes of the past when executing new civil engineering structures, the contents of this book should be known by every designer and contractor. One way for this to happen is for the universities responsible for educating tomorrow's professionals to require their students to read it for essential background education.

TOBY MOTTRAM