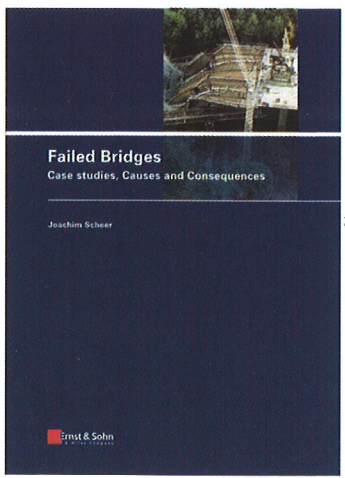
Book Reviews



Failed Bridges: Case Studies, Causes and Consequences
by Joachim Scheer (author), Linda Wilharm (translator)

Wilhelm Ernst & Sohn (Wiley group), 2010, 321 pp., ISBN 978 3 433 02951 0

The analyses of historic failures have been the stuff of much engineering science. Failures of bridgeworks have featured in many texts and teaching programmes. Professor Scheer has assembled a large variety of histories of failures and classified them by his own criteria. A total of 536 incidents have been examined in varying degrees of detail with a declared absence of detailed information in 96 cases. He has assigned each case to one of nine failure categories.

His cases are mostly taken from German published sources supplemented by a few, mostly American, but not exclusively so, and other English-language sources. He is at his best when presenting events in which he has been involved for over fifty years – often as a forensic expert. Many are unpublished elsewhere. This is the second edition of a text, first published in 2000 in German only. Although the second edition has been competently translated into English, the author has given scant attention to non-German sources during the decade between editions.

The author does not claim to be encyclopedic. This is perhaps as well, as no British author of a book of similar scope would have omitted to mention both the Bragg and Merrison reports. Neither is referred to by name, and it is unlikely that an uninformed reader would be aware of any of their activities after reading this text. The collapse of the falsework for the Loddon Viaduct, which triggered the

Bragg Report and led to BS5975 and subsequently to EN 12812, is not mentioned in a coherent way. Unfortunately, a garbled entry in a table on page 226 muddles the Loddon and the West Gate Bridge disasters. The West Gate Bridge in Melbourne and its exemplary Royal Commission report has also been given short shrift. Three small photographs from the latter and the briefest summary did find their way into the text. The Cleddau Bridge, although in his lists, is only cited once – from a 1972 journal article published in Belgium. The article cited is a relatively brief comparison of three comparable steel box girder collapses. The Merrison report is unmentioned.

For the informed British reader it is perhaps a blessing not to have such well-known disasters repeated again, and salutary to be reminded that most of the world has little time to pay attention to smaller countries like the UK. There are valuable lessons to be learnt from failures in bigger countries like Germany and the USA. Professor Scheer's choice of historic accidents is most instructive. His case studies reflect the likely causes of bridge failures. Three-eighth failed during construction, more than a third of those as a result of falsework failing. A further quarter failed in normal service (usually from one of five causes – defective design, structural overload, material problems such as corrosion, wind or other dynamic effects, or deficiencies in maintenance). Another eighth arose from the impact of a ship collision. The final quarter failed from natural or man-made events such as flood, ice, fire, vehicular impact or seismic activity.

This mass of data has been impressively marshaled to provide a coherent 29 pages of concluding remarks listing the main lessons from history. He describes general lessons learnt from each stage – design, structural detailing, construction management, the subsequent inspection and maintenance of old bridges. Three of these pages summarise the author's own perspective of these lessons applied to the practice of engineering.

A further two pages gleaned from over thirty years' experience of teaching and research are concerned with the teaching of structural engineering. Scheer cautions against the pursuit of easy to teach analytical processes with programmable, reproducible results. He emphasizes the difference between this approach and educating students in structural design – a creative process, which does not have a 'correct' answer. He suggests a dozen of different training methods that assist in developing design skills. His dozen include several based on the lessons of history, including acting out actual construction information exchanges, developing new methods to analyse existing structures, and assigning groups of students the task of describing actual structural failures and discovering their causes.

This is a fascinating book. It tackles a complex topic in a most comprehensive manner. Its minor flaws are more than offset by the weight of evidence assembled and should be appreciated by all who need to learn the lessons of history in construction.

Robert C. McWilliam