

# Review



**Dr Panagiotis Kotsovinos** finds this book and its worked examples to be a useful introduction to the subject of structural fire engineering, particularly for buildings with relatively simple structural arrangements.

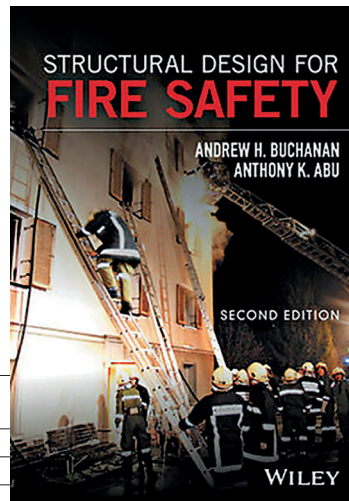
## Structural Design for Fire Safety (2nd ed.)

**Authors:** Andrew H. Buchanan and Anthony K. Abu

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The first edition of this book, authored only by Prof. Buchanan, was published in 2002. It was the first comprehensive publication in the field of structural fire engineering and a key reference for international undergraduate/postgraduate courses in this area.

The field of structural fire engineering is rapidly evolving and there have been a number of developments since 2001 – notably the collapse of the World Trade Center towers in New York and subsequent research on the structural fire response of complex structures, and the rally in innovation of structural forms, construction methods and materials (modular construction, high-strength materials, etc).

In this second edition, Prof. Buchanan was joined by Dr Abu and the authors tried to fill some of these gaps. Both authors are globally recognised academics/researchers in the field of structural fire engineering and have contributed to the advances in the discipline. It should be noted that the second revision is relatively light in the amount of new material introduced in proportion to the research that has been undertaken in the last 15 years; however, this is expected given the generally

introductory nature of the book. Some parts of the book that are now redundant, due to developments in the field since the first edition, have been removed.

In the first chapters, the reader is introduced to the fire safety design of buildings and how structural fire resistance becomes relevant to achieve the fire-safety objectives. Then the fire phenomena are described, including the various stages that a fire may go through and the design fires provided in the Eurocode and elsewhere for structural fire engineering purposes, with a focus on typical compartment fires; fires in large enclosures ('progressive burning' and 'localised fires') are only briefly covered. The various principles of heat transfer from a fire to the structure and within a structural member are also briefly covered.

The concepts of 'fire severity' and 'fire resistance' are then introduced. The authors describe the process of relating a real fire to the standard fire in order to assess its fire severity. They also describe how fire resistance is achieved for various structural and non-structural components.

The design process of structural members and assemblies in fire is then discussed, including a description of the

applied loads at the fire limit state and how a probability of failure can be established. In the subsequent chapters, the behaviour and design of steel, concrete, composite and timber structures and light-frame construction, including properties of fire protection materials, are covered in more detail.

A new chapter on advanced calculation methods was introduced in this edition to capture the advances in the fire, thermal and mechanical modelling and the increased desire for the application of these methods in the design environment. A chapter on design recommendations is also provided at the end of the book with overall best-practice guidance for designers.

A useful feature throughout the book is that it includes a number of worked examples at the end of each chapter to take the reader through a practical application of some of the analytical formulations provided.

The book serves as an introduction to the subject of structural fire engineering. The reader would need to refer to other sources for more advanced subjects, such as advanced thermal and mechanical analysis, probabilistic design methods and the in-depth complexities of the fire dynamics and heat-transfer science. Additionally, it is concentrated on buildings with relatively simple structural arrangements; more complex structural arrangements would generally require further considerations. Non-building structures, such as bridges, tunnels and stadia and arenas, are only very briefly covered.

### Panagiotis Kotsovinos

Dr Panagiotis Kotsovinos is a fire engineer with Arup and has worked in several structural fire engineering projects in the UK and internationally. He is a member of the revision panel of the Institution of Structural Engineers' introductory and advanced fire safety engineering guides. Dr Kotsovinos is also a member of BSI, ISO and SFPE committees related to fire safety engineering and has also authored a number of publications in this field.