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## Preface

Tunnelling is an exciting and rapidly evolving technology. Pioneering processes are commonplace and innovative thinking continues to rewrite the rules. In civil engineering, tunnelling is one of the few areas where new horizons are constantly being discovered.

But for the profession to reach its full potential, tunnelling needs to be more accessible to those talented engineers in search of new challenges and keen to make lasting contributions to society.

In the eyes of too many, tunnelling is still seen as the exclusive domain of too few: a mysterious art form, accessible only to those who have already spent countless years perfecting their approach, a skill whose secrets remain suppressed.

Over the following pages I hope to show that tunnelling need not be a closed book. I have omitted methods and definitions that depended more on historical precedent than modern scientific evaluation. Instead of confusing the reader with countless details and definitions that are in any case open to change, I have focused on the underlying concepts that make tunnelling easier to grasp.

So while this book is designed to provide a concise, up-to-date and useful frame of reference to all those newly qualified and engaged in the field, I hope that it will also serve to reveal to those talented engineers who thought they had found their niche above ground the very real opportunities and unanswered questions that await them underground.

As rock mechanics is less developed and less known than soil mechanics, the principles of this young discipline are included in this book. I also attempted to integrate theoretical and practical viewpoints, since I consider both of them indispensable to engineering. The often encountered attitude of practitioners to blame theory (and vice versa) is regrettable. The theory addressed here refers to the mechanics of soil/rock behaviour and its interaction with the various support structures. Some chapters of the book aim at the description of planning and construction processes and, thus, need no reference to theory. Some other chapters contain both, practical and theoretical aspects. Some

others again are of theoretical nature and refer also to open questions and yet unsolved problems. They aim not only at informing the reader about the present state of knowledge but also at highlighting the possibilities of theoretical approach and stimulating research. In many cases the link between practical and theoretical aspects is established by cross-references. Lengthy theoretical derivations are presented in appendices. Those readers who are merely interested in basic concepts and practical applications can skip the theoretical parts.

Cut and cover tunnelling is not included in this book, as the underlying approaches, such as diaphragm walls etc., are described in textbooks of geotechnical engineering. The reader should take into account that all quantitative statements, referring to e.g. strength of materials, costs, durations etc., are understood as mere examples, as they are subject to technical progress.

As in every book, the distribution of emphasis is subjective and mirrors the scientific profile of the author. My aim is to inform the reader about concepts relevant for tunnelling rather than putting together all available information on the topic. The exhaustive completeness encountered in codes and standards has been avoided, as it would render the text too lengthy and falls beyond the scope of this book.

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