

are often subject to different loading conditions at different stages of their lives as a result of the creation of other excavations in whose zones of influence they lie. Furthermore, the rocks surrounding excavations in underground mines, and coal mines in particular, frequently exist in a 'post-failure' condition, often induced deliberately by the mining method. The differences in the deformation and fracture behaviour of the various Coal Measures strata—mudstones, sandstones, seatearths and the coal itself—provide a further source of complexity.

The problems requiring solution are challenging and of great economic importance, but all too often coal mine design practice ignores the application of the principles of engineering mechanics and a knowledge of the deformation and fracture behaviour of the materials involved. Although he does not seek to provide a design manual, Farmer is concerned ultimately with improving coal mine design procedures through the use of a rational approach based on engineering mechanics. His more limited aim in this book is 'to show, often through consideration of quite detailed laboratory and field data, how the observed performance of some underground structures during mining, can be explained by the deformation characteristics of the rocks which surround them'. He fulfils his purpose in a most instructive manner.

The book is based on the results of a study of the behaviour of openings in British coal mines, sponsored by the National Coal Board and the European Coal and Steel Community, and carried out at the University of Newcastle upon Tyne between 1976 and 1982. Thus, it presents as a coherent whole material which was previously available only in research reports, theses and individual papers.

The opening chapter reports the results of a laboratory study of the engineering behaviour of Coal Measures rocks. The influence of shear zones, faults, joints and cleats on the behaviour

of coal mine structures is well illustrated and emphasized. Chapter 2 is concerned with the design of rooms and pillars which constitute the simplest form of coal mine layout. Chapter 3, on tunnels and drifts, considers the stress distributions around tunnels, the interaction between rock deformation and support, and the behaviour of various types of tunnel support. Shafts and insets, which together provide the main access to mine workings, are the subject of Chapter 4. This chapter presents and analyses the results of stress and displacement measurements made by the author and his colleagues in shaft and inset linings in a number of British mines. Chapter 5 deals with strata deformation above long wall faces. This involves considerations of the mechanics of strata deformation, vertical settlement and subsidence, concepts of caveability and water flows induced by strata deformation. Chapter 6 discusses the complex question of the deformation of access roadways and the behaviour of roadside packs. Coal face strata deformation and support, which present a different set of problems, are considered in Chapter 7. Finally, Chapter 8 discusses the distinct problems of rock bursts and outbursts.

Because it reports work carried out in British coal mines by the author and his colleagues, the book sometimes gives insufficient prominence to contributions made by other workers and in other countries. Nevertheless, it presents a comprehensive account of its subjects that is not matched elsewhere. This book should be studied by all teachers and advanced students of mining, and by practising mining engineers, particularly those in the National Coal Board. It also merits study by those geotechnical engineers whose concerns may be the more traditional civil engineering concerns. Among other things, such study will develop an increased understanding of the challenges faced by those of their colleagues who practice their geotechnical craft in the difficult, and sometimes hostile, mining environment.

E.T.B.

Corrigendum

The in situ wedge shear test—a new technique in soil testing. T. Mirata. *Géotechnique* **24**, No. 3, 311–332.

On page 318, Fig. 6, the key should read as follows.

——— $c = 0.30 \text{ kg/cm}^2$
 - - - - $c = 0.05 \text{ kg/cm}^2$