



Book Review

Ground Engineering - Principles and Practices in Underground Coal Mining

by J.M. Galvin

Reviewed by Horst Wagner

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The book by Emeritus Professor Jim Galvin on *Ground Engineering - Principles and Practices for Underground Coal Mining* is not just another rock mechanics text but fills a serious gap in the mining and rock mechanics literature as it establishes a link between ground engineering, mine management, and risk management. To understand and appreciate the book it is necessary to take a closer look at the professional background and career of the author.

As a young graduate with a double degree in mining engineering and applied mathematics from the University of Sydney, Jim Galvin joined the South African Chamber of Mines Research Organization in the 1970s as a research officer to work on strata control problems in the coal industry. This work provided him with the opportunity to visit most coal mines in South Africa and to gain a deep insight into the rapidly expanding and changing coal industry. As part of his research work, Jim joined others involved in the longwall trials at Coalbrook Collieries, Matla Colliery, and New Denmark Colliery, pillar extraction mining at Vierfontein Colliery, and thick seam mining at Springfield Colliery. In 1981 he gained his PhD in rock mechanics at the University of the Witwatersrand for his work on thick seam coal mining. During his stay in South Africa, Jim successfully completed the South African Colliery Managers programme.

In 1982 Jim Galvin returned to Australia to gain practical, operational, and management experience in the coal industry. After a short period with Newcom Collieries he advanced from underground mineworker to mine manager of Angus Place Colliery. In the early 1990s Jim left the coal industry to join the University of New South Wales (UNSW) as Professor of Mining Engineering. From 1995 to 2002 he was Head of the School of Mines at UNSW. The theoretical, practical, and management background of Professor Galvin was soon recognized by government authorities both in Australia and internationally, and he became more and more involved as an advisor to the mining authorities and as expert in high-level investigations and inquiries. In 2002 he left UNSW to set up an international consulting practice.

This comprehensive text has evolved over many years and is based on the unique experiences that the author has gained as a researcher, mine planner, mine operator and mine manager, and top-level advisor to mining authorities. In the book, ground engineering principles are covered as far as these are of relevance and importance to underground coal mining. The particular strength of the book is the way in which good underground coal mining practice is identified and discussed within an understandable, logical, and often qualitative applied mechanics framework. It is written and presented in a manner that can be understood and followed by coal mine operators. Numerous examples of good and poor mining practice illustrate and support the basic ground engineering principles presented and discussed in the text.

Book Review *(continued)*

A particular and unique aspect of the book is the link established between ground engineering and risk management. Given the great number of variables and the difficulties of quantifying these, risk management is an essential element of good and sound ground engineering practice. The basic principles of risk management are presented and numerous examples of applying these principles to ground engineering in coal mines are given. The text does not confine itself to ground control but also highlights how ground control and rock behaviour can influence other coal mining hazards, such as those related to coal mine explosions and spontaneous combustion. All essential aspects of ground control in underground coal mines are covered in 684 pages. The following topics are addressed in twelve chapters: scope of ground engineering, fundamental principles of ground engineering, excavation mechanics, pillar systems, interaction between workings, support and reinforcement systems, ground support design, total extraction mining (*i.e.* pillar extraction), longwall mining, overburden subsidence, operational hazards, and managing risk in ground engineering. A comprehensive list of references provides additional sources of information.

To the knowledge of the reviewer there is no comparable text that covers ground engineering principles and underground coal mining practice in such a comprehensive way. This book fills a serious gap in the mining and rock mechanics literature. Although it concentrates on underground coal mining practices in Australia, South Africa, and the USA, many of the issues raised and discussed are of relevance and considerable value to underground mining operations in other parts of the world. This book is not only of value to ground engineering specialists on coal mines, but will be of equal value to coal mine planning personnel, coal mine managers, and mining authorities.

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