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Edited by L. WADE, R.W.O. KERSTEN and J.R. CUTLAND

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PREFACE

APCOM '87, the twentieth in this series of international meetings, places major emphasis on the practical application of computers in the workplace to implement the theoretical techniques. This theme is indeed appropriate for a symposium being held in Johannesburg, the heart of the world's most dynamic minerals industry. It is fifteen years since an APCOM Symposium was last held in Johannesburg and it is gratifying to know that many of the contributors to the 1972 meeting will again attend in 1987. Several pioneering contributions were made in 1972, and many of those new theoretical ideas are now accepted as standard procedures.

Whilst many of the theoretical concepts presented at previous APCOM symposia have become accepted as standard methods within the mining industry, the papers contained in this volume demonstrate how rapidly developments in the field have overtaken history. In particular, the era of the microcomputer and interactive graphics can be seen to have truly dawned. Pointers for the future, in the form of expert systems and artificial intelligence, are also in evidence.

These state-of-the-art trends are demonstrated over the full spectrum of mining applications. Familiar topics such as rock mechanics and ventilation are the subject of detailed coverage whilst computerised mine planning systems continue their APCOM tradition of accounting for a considerable proportion of the symposium Proceedings. Less obvious applications addressed by authors include the use of computers for the control of mining operations and in the field of tertiary mining education.

Contributions from authors in many countries demonstrate continued world-wide interest in APCOM, and in the use of computers to solve real mining problems. Many of the participants have contributed to previous symposia in the series, whilst a gratifying number of new authors are taking this opportunity to publish their innovative work for the first time.

The papers in this volume reflect the current status of technical computing in the mining industry. Collectively they demonstrate how far techniques have advanced since the first APCOM in 1961, whilst also showing that the process of development has not reached a conclusion. It is clear that computers are no longer the sole preserve of data-processing specialists, but have become tools to be used by mining engineers and the associated technical disciplines for the solution of practical problems. As such, the extent to which they will gain further acceptance is limited only by human ingenuity, a commodity which has never been in short supply in the mining industry.

The production of the Proceedings from camera-ready copy in time for distribution to all delegates at the Symposium has been an enormous task in spite of the ubiquity of word processors. All papers were thoroughly reviewed and selection of papers was sometimes difficult. We attempted to achieve a good balance between theory and application but did give some preference to papers that emphasised practical applications. It is anticipated that many of the innovative procedures discussed in the papers will be on display at the Symposium exhibition.

We are grateful to the authors for meeting our requirements for camera-ready copy. Without this co-operation it would not have been possible to prepare the published Proceedings in three permanent volumes of such high quality. A debt of gratitude is due to our many referees, who must remain anonymous, for their contributions. Many papers were significantly improved for publication as a result of their suggestions.

The credit for the high standard of this volume must go largely to John Austin, who chaired the Publications Committee, and our Technical Editor, Matthew Seal. Together they planned the volumes and solved the many technical problems that arose during the course of production. Matthew Seal undertook the enormous task of technical editing and the high standard that he has achieved will be a long-lasting tribute to his industriousness and care.

We are confident that this collection of Proceedings of APCOM '87 will remain as an important reference work for many years to come.

L. WADE
J.R. CUTLAND
R.W.O. KERSTEN

August 1987
FOREWORD


Following its inception in 1961, the APCOM symposia have developed into a fully international series with participants from a wide spread of countries. Including APCOM '87, the symposia will have been hosted six times outside the USA, i.e. in Canada, South Africa, Germany, Australia and the United Kingdom.

APCOM has an established reputation for the high standard of the technical papers published in its Proceedings. This is due very largely to the fact that APCOM attracts the participation of internationally known specialists of high calibre and to the commitment of a number of dedicated individuals who serve on the International Committee and from time to time on the local Organizing Committees.

The International Committee has in the past and still operates on an informal basis, with 'permanent' representation from the USA (Arizona, Colorado, Penn State and the Society of Mining Engineers), Canada, South Africa and Germany, and 'temporary' membership of other past and future hosts.

APCOM symposia provide a medium of exchange of technical expertise and experience for practitioners in the general field of applications of computers, operations research, mathematical and geostatistical techniques in the mineral industries. Contributors represent mine and plant personnel, academic and government or semi-government representatives, and the topics covered range from mining and metallurgical techniques and planning to financial analysis, project valuation, information systems, computer graphics, geostatistics, etc.

For the 20th APCOM, the Proceedings have been divided into the three broad categories of mining, metallurgy and geostatistics, and are grouped accordingly into the three published volumes.

The success of any APCOM symposium depends critically on the backing of the host organizations, the contributions from members of the various committees involved, the authors of the technical papers, session chairmen and keynote speakers, and also on the support of the mining and mineral industries within the host country concerned. The Organizing Committee for the 20th APCOM wishes to record its deep appreciation to all the individuals and bodies which have contributed so generously to the success of this Symposium.

D.G. KRIGE

September 1987
APCOM 87
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Abbreviations
COM Chamber of Mines of South Africa Research Organization
CSSA Computer Society of South Africa
GASA Geostatistical Association of South Africa
MINTEK Council for Mineral Technology
SAIMM The South African Institute of Mining and Metallurgy

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