

Director

Expertise Rock Mechanics and Strata Control, Geotechnical Engineering, Mining Geology, Numerical Modeling

Education MSc. (Engineering Geology), 1984
Leeds University, UK
BSc. (Mining Geology), 1983
Royal School of Mines, Imperial College London, UK

Professional Affiliations & Registrations

Registered Professional Natural Scientist (Pr Sci Nat), South African Council for Natural Scientific Professions
Member, South African National Institute of Rock Engineering (SANIRE)
Member, South African Institute of Mining & Metallurgy (SAIMM)

Professional Experience

1994 – Present *Itasca Africa (Pty) Ltd., Johannesburg, South Africa*
Senior Engineer/Director

1985 – 1994 *Western Deep Levels & Elandsrand Mines, South Africa*
Rock Mechanics Practitioner

Project Experience

General Rock Mechanics: Extensive experience in practical rock mechanics, underground observation and strata control in a deep, high-stressed, gold mine environment obtained as a rock mechanics practitioner at Western Deep Levels and Elandsrand Mines. Head of the Rock Engineering Department at WDL South (now Mponeng) Mine for 5 years, responsible for overall rock-engineering service, supervision of junior staff, rock-engineering training, and installation and running of a seismic system. Involvement in mine planning, layout and mining-sequence design, support specification, backfill implementation, codes of practice to alleviate accidents, rock-related accident investigation. Worked in collaboration with CSIR Miningtek at WDL with projects to assess the performance of cemented backfill as well as stabilizing pillars.

Rock bursting & Seismicity: Extensive exposure to problems associated with seismic activity in deep gold mines. Design of preventative and control measures for rockbursting: tunnel and stope-support systems, bracket pillars on structures, mining layouts to minimize seismicity, implementation and application of seismic monitoring at Western Deep Levels.

Shafts and Shaft Pillar Extractions: Responsible for the evaluation of the rock mechanics aspects of design, sinking and implementation of the Western Deep Levels South (Mponeng) sub-shaft system. This was the first deep-shaft system in the South African gold mining industry, where, from the outset, total-shaft reef extraction and no protective pillar were planned. Involved subsequently in numerous assessments of mining layouts and potential for excavation damage when extracting shaft pillars at Savuka and TauTona, Western Holdings 8 shaft, Freddie's 7 shaft, Saaiplaas 5 shaft, Beatrix 3 shaft, Impala 16, 17 and 20 shafts, Driefontein 4 shaft, Great Noligwa and Kloof 1 and 3 shafts.

Numerical Modeling: Extensive use of boundary element, finite difference and discontinuum programs in solving geomechanics problems, including the programs BESOL, MINSIM, *FLAC*, *UDEC*, *3DEC* and *FLAC3D*; has conducted training courses in *FLAC* and *UDEC*.

Tunnel Design and Support: Involvement in various high-speed tunneling projects for deep gold mines, including Elandsrand, Vaal Reefs and Western Deep Levels, plus research funded by the Deepmine Project initiative. Work has focused on the optimization of tunnel shape coupled with bolting and shotcrete support systems. Developed simple empirical tools for the assessment of fiber-reinforced shotcrete specifications under various tunneling conditions.

Block Cave Mining: Production-level and undercut development layout problems, including potential for stress damage to tunnels, loading on concrete tunnel linings and required support systems (Cullinan/Premier, Finsch, Wesselton, Kofffontein, and Dutoitspan diamond mines), and PT Freeport Indonesia, including the merits of pre- versus post-undercut development of extraction levels.

Undercut sequences at Dutoitspan, Premier and Finsch Mines.

Mining layout guidelines for the new deep block cave at Cullinan (C-Cut), including production and undercut-level excavation geometries and any changes in overall mine stability. Similar exercises for Block 4 planning for Finsch diamond mine.

Comparison of the effects of caving versus cut-and-fill mining methods on surface structure stability (Shangani, Zimbabwe).

Simple caving-draw analysis using *PFC* for early analyses for Bingham Canyon.

Steep Orebody Mining: Stability of large open stopes for steep orebodies (Ashanti, Ghana).

Assessment of shaft stability adjacent to massive mined-out areas and support requirements for new access infrastructure at Lepanto Consolidated Mines, Philippines.

Various projects and rock engineering services for Black Mountain Mine in the Northern Cape, South Africa. Work has included the assessment of surface structure stability, design of open stoping layouts for the Swartberg deposit, assessment of safe removal of final remnants in the Broken Hill deposit, where cut-and-fill mining is practiced, provision of design criteria for the new deep ore deposit, and underground geotechnical mapping and core logging to derive rock mass ratings.

Zambian Copper Belt: Provision of all geotechnical services for the Anglo American feasibility study for the Konkola Deep Mining Project. Geotechnical aspects of the design of cut-and-fill, room-and-pillar, and open-stoping mining methods at depths from 600 m to 1400 m and dips from 20° to 70° in orebody width from 5 m to 15 m. Assessment of various design issues for Mopani Mines operations at Nkana (Mindola) and Mufulira.

Shallow Tabular Mining: Stability of near-surface gold mine stopes on multiple reef horizons beneath railway lines near Krugersdorp. Provision of geotechnical mapping service for Kroondal Platinum Mine.

Numerical modeling to assess room-and-pillar design stability for Eastern Chrome, Western Chrome, Messina Platinum and Kroondal Platinum Mines, and stability in various coal mining operations.

Rock Mass Characterization: Geotechnical mapping and rock-mass rating estimates carried out for various operations, such as Black Mountain, Kroondal Platinum, Dukwe Copper, and including an extensive rock-mass drilling and characterization program to identify suitable areas for quarrying to produce aggregates and large armor stone for construction of a port and breakwater at Fort Dauphin in Madagascar.

Feasibility Studies: Provision of rock-engineering design input for various feasibility studies, including Konkola Copper Mines (Anglo American), Cullinan (C-Cut), PT Freeport Indonesia's Big Gossan deposit, Impala Platinum 16 and 17 shafts, Lonmin's Loskop and Akanani Projects, African Copper's Dukwe Copper Project and, most recently, Katanga Mining's Kamoto project in the DRC as a subcontractor to SRK.

Surface mining: Stability assessments, numerical modeling and compilation of rock engineering codes of practice for various open pits, including andalusite, chrome, diamond, copper and coal operations.