

Table of Contents

iii	Australian Centre for Geomechanics
v	Committees
vi	Technical Reviewers
ix	Preface
xi	Conference Sponsor

KEYNOTE ADDRESSES

3	Relying on suction to maintain slope stability <i>AB Fourie, The University of Western Australia, Australia</i>
13	Designing with risk <i>J Venter, Julian Venter Consulting, Australia</i>
25	Implications of groundwater behaviour on the geomechanics of rock slope stability <i>J Price, SRK Consulting (Australasia) Pty Ltd, Australia</i>
49	Engineering geological modelling for pit slope design in the porphyry copper-gold deposits of Southeast Asia <i>MJ Eggers, Pells Sullivan Meynink, Australia and University of Canterbury, New Zealand</i>
83	Blasting near open pit walls <i>CK McKenzie, Blastotechnology, Australia</i>

MONITORING AND RISK MANAGEMENT

97	Influence of salinity and suction on slope stability in transported material <i>PM Dight, Australian Centre for Geomechanics and The University of Western Australia, Australia; Q Hong, A Dyskin, E Pasternak, The University of Western Australia, Australia</i>
107	Cowal gold mine — documentation of slope deformations due to mining to final pit walls — a case history <i>RL Crouse, Evolution Mining, Australia; DR Wines, Itasca Australia Pty Ltd, Australia</i>
127	Relict structure in saprolite — a case study <i>L McKenzie, Pells Sullivan Meynink, Australia</i>
135	Surface water management — a key (but often forgotten) component of pit slope stability management <i>JW Hall, RPS Water Management, Australia</i>

MODELLING AND ANALYSIS

143	Three-dimensional numerical modelling of potential structurally controlled failure mechanisms at the Kanmantoo open pit <i>DP Sainsbury, A Vakili, DS Lucas, Mining One Consultants Pty Ltd, Australia; BJ Hutchison, Hillgrove Resources Ltd, Australia</i>
157	Discrete fracture network modelling for hard rock slopes <i>FM Weir, MJ Fowler, Pells Sullivan Meynink, Australia</i>
169	Influence of damping parameters within a finite element model using the example of high energy impacts resulting from dynamic compaction <i>S Klemm, A Muehl, Y Koitzsch, CDM Smith, Germany; F Gneist, MIBRAG, Germany</i>
183	Geotechnical optimisation of Southern Ridge Cutback 3 at Tom Price mining operations <i>TM Johnson, Rio Tinto Iron Ore, Australia; V Pere, Rio Tinto Kennecott, USA; R Dixon, Rio Tinto Iron Ore, Australia; P de Graaf, The De Beers Group of Companies, South Africa; DR Wines, Y Hebert, Itasca Australia Pty Ltd, Australia</i>

PRACTICAL ANALYSIS

- 203 Structural domain determination — practicality and pitfalls
Jl Mathis, Zostrich Geotechnical, USA
- 213 Pit slope evaluation based on the historical failure database at Batu Hijau mine
HD Lelono, PT. Newmont Nusa Tenggara, Indonesia; FRP Basson, Newmont Mining Corporation, Australia; J Lupo, Newmont Mining Corporation, USA; Y Adriansyah, PT. Newmont Nusa Tenggara, Indonesia
- 225 Geotechnical analyses for risk management of a large scale failure at Century mine, Northwest Queensland
E Sweeney, K Abbott, MMG Limited, Australia
- 239 Slope steepening of the Golden Pike west wall at Fimiston Pit
GP Bungard, A Gleeson, Kalgoorlie Consolidated Gold Mines, Australia; FRP Basson, Newmont Mining Corporation, Australia

DESIGN CONSIDERATIONS

- 255 Simplified Step-Path method for rock slopes
NRP Baczynski, Prime Geotechnics Pty Ltd, Australia
- 271 Step-Path method — impact of defect occurrence, cut-off and length on shear strength in rock slopes
NRP Baczynski, Prime Geotechnics Pty Ltd, Australia
- 289 Hoek–Brown m_i estimation — a comparison of multistage triaxial with single stage triaxial testing
J Venter, Julian Venter Consulting, Australia; C Purvis, Trilab, Australia; J Hamman, Mining One Consultants Pty Ltd, Australia
- 301 Geotechnical challenges in development of El Soldado open pit
EO Bermedo, NA Cordova, AngloAmerican Chile, Chile

DESIGN AND RISK MANAGEMENT

- 315 Unconventional methods to treat geotechnical uncertainty in slope design
LF Contreras, The University of Queensland and SRK Consulting (South Africa) (Pty) Ltd, Australia; M Ruest, The University of Queensland, Australia
- 331 Estimation of in situ strength from back-analysis of pit slope failure
IR Brown, PJ Wood, TAGA Engineering Software Ltd, New Zealand; MK Elmouttie, CSIRO Energy, Australia
- 339 Difficulties establishing a common understanding to address risk in mining — challenges in meaningful communication of probabilistic expressions
C Zermatten, PJ Terbrugge, SRK Consulting (South Africa) (Pty) Ltd, South Africa
- 353 Slope design at Mt Rawdon gold mine
R Jele, Evolution Mining, Australia; T Sullivan, Pells Sullivan Meynink and The University of New South Wales, Australia

MONITORING SLOPES AND ROCKFALLS

- 367 Slope stability radar alarm threshold validation at Telfer gold mine
P Saunders, GroundProbe Pty Ltd, Australia; S Nicoll, C Christensen, Newcrest Mining Limited, Australia
- 379 Use of SAR radar satellite data to measure ground deformation in underground and open pit mine sites, El Teniente case study, Chile
F Sánchez, A Conde, B Salvà, D Colombo, TRE ALTAMIRA S.L, Spain
- 387 Techniques for three-dimensional displacement vector using ground-based interferometric synthetic aperture radar
L Leoni, IDS Ingegneria Dei Sistemi, Italy; G Spencer, IDS Australasia, Australia; N Coli, F Coppi, A Michelini, IDS Ingegneria Dei Sistemi, Italy

- 393 Hybrid rockfall barrier — new design methodology based on the Colorado full-scale test experience
M Cerro, Maccaferri Asia, Malaysia; G Giacchetti, Officine Maccaferri, Italy; M Lelli, Maccaferri Asia, Malaysia; A Grimod, France Maccaferri, France; A Arul, Maccaferri Asia, Malaysia
- 407 A journey of wall control improvement at Boddington Gold
CC Graf, R Sullivan, Newmont Mining Corporation, Australia
- 421 Rockfall mitigation measures and design scenarios at the base of highwalls
C Lambert, Golder Associates (NZ) Ltd, New Zealand; F Ferrari, K Thoeni, A Giacomini, The University of Newcastle, Australia
- 435 Attenuator systems — an old method to deviate rocks but a new testing method for developing a design concept
J Glover, Global Risk Forum Davos, Switzerland; DC Wyllie, Wyllie & Norrish Rock Engineers Ltd., Canada; R Bucher, Geobrugg Australia Pty Ltd, Australia
- 443 ETAG certified rockfall barriers — new design approach according to UNI 11211:4/2012
M Cerro, Maccaferri Asia, Malaysia; G Giacchetti, Officine Maccaferri, Italy; M Lelli, Maccaferri Asia, Malaysia; A Grimod, France Maccaferri, France; A Arul, Maccaferri Asia, Malaysia
- 457 Rock fall trajectory field testing, model simulations and considerations for steep slope design in hard rock
N Bar, Gecko Geotechnics Pty Ltd, Australia; S Nicoll, F Pothitos, Newcrest Mining Limited, Australia

SLOPE PERFORMANCE

- 469 Rock slope stability risks
NRP Baczynski, Prime Geotechnics Pty Ltd, Australia
- 485 Probabilistic slope stability analysis as a tool to optimise a geotechnical site investigation program
M Zoorabadi, SCT Operations Pty Ltd and The University of New South Wales, Australia; I Canbulat, The University of New South Wales, Australia; M Ruest, The University of Queensland, Australia
- 493 Rock mass assessment — what goes wrong?
A Duran, Pells Sullivan Meynink, Australia
- 507 Modelling concepts of passive arch action in undercut slopes
T Pipatpongsa, Kyoto University, Japan; MH Khosravi, University of Tehran, Iran; J Takemura, Tokyo Institute of Technology, Japan; C Leelasukseree, Chiang Mai University, Thailand; P Doncommul, Electricity Generating Authority of Thailand, Thailand

GEOTECHNICAL DATA CONSIDERATIONS

- 523 A note on design parameters for in-pit coal waste dumps in weak rock
PJN Pells, Pells Consulting, Australia
- 531 Remediation of the uranium mill tailings pond Dänkritz 2 — seismic slope stability analysis and serviceability limit state design
Y Koitzsch, S Klemm, A Muehl, CDM Smith, Germany; U Barnekow, M Speer, Wismut GmbH, Germany
- 545 Common errors in the slope stability analyses of tailings dams
B Brown, I Gillani, Rio Tinto Technology and Innovation, Australia
- 557 Optimisation of internal dump capacity and stability analysis in a coal mine — a case study
SS Gupte, Visvesvaraya National Institute of Technology, India

GEOTECHNICAL DATA AND DESIGN

- 573 The benefits of undertaking robust structural mapping for the slope design, management and excavation processes
MK Elmoultie, P Dean, G Krahenbuhl, J Allemand, CSIRO Energy, Australia
- 587 Discontinuity survey and brittle fracture characterisation in open pit slopes using photogrammetry
Z Tuckey, J Paul, J Price, SRK Consulting (Australasia) Pty Ltd, Australia
- 601 Large scale three-dimensional pit slope stability analysis of the structurally controlled mechanism in Mae Moh coal mine
A Chaiwan, C Leelasukseree, Chiang Mai University, Thailand; N Mavong, Electricity Generating Authority of Thailand, Thailand

MONITORING

- 613 Geomechanical status and action plans for interaction between Andina subsidence crater and Los Bronces open pit
DA Díaz, MG Schellman, Anglo American Chile, Chile
- 629 A real-time seismic and displacement monitoring system for rock instability assessment — case studies in the French Alps
P Mourot, MYOTIS, France
- 639 Microseismic data — a comparison between routine trigger method and continuous data processing
M Salvoni, IG Morkel, PM Dight, Australian Centre for Geomechanics and The University of Western Australia, Australia
- 657 Overall and bench slopes stability study using microseismic monitoring technique at Sandaozhuang open pit mine
F Peng, F Lin, J Hu, S Li, Changsha Institute of Mining Research Co., Ltd, China; J Cheng, C Wang, J Gao, China Molybdenum Co., Ltd, China
- 663 Research on quality factor for evaluating stability of high and steep rock slope fractured by underground mining
J Hu, Changsha Institute of Mining Research Co., Ltd, China; S Li, Xiamen University, China; P Li, Yuxi Dahongshan Mining Co., Ltd, China; F Lin, Changsha Institute of Mining Research Co., Ltd, China; Z Xing, Yuxi Dahongshan Mining Co., Ltd, China; F Peng, Changsha Institute of Mining Research Co., Ltd, China; Z Lin, J Bao, Z Yu, Yuxi Dahongshan Mining Co., Ltd, China

DATA AND VISUALISATION TECHNOLOGIES

- 673 InSAR derived synoptic ground surface deformation map of the Porgera Mine, Papua New Guinea
BC Macdonald, TRE ALTAMIRA Inc., Canada; R Sharon, Barrick Gold Corporation, USA; S Muir, Barrick Gold Corporation, PNG; JP Iannacone, G Falorni, JS Michaud, TRE ALTAMIRA Inc., Canada
- 685 Wireless low power real-time solutions for tailings dams — a case study
C Abancó, E Falgàs, B Payàs, J Pérez-Arcas, Worldsensing, Spain; P Scott, ITM Soil, Australia
- 695 Operational mine monitoring with InSAR
K Taylor, Freeport-McMoRan, USA; P Ghuman, A McCardle, 3v Geomatics Inc., Canada

NEW METHODS FOR ANALYSIS AND CONTROL

- 709 New results of large-scale testing of high-tensile steel meshes and soil nails for slope stabilisation and validation of modelling software
R Bucher, Geobrugg Australia Pty Ltd, Australia; C Wendeler, Geobrugg AG, Switzerland; P Baraniak, Bern University of Applied Sciences, Switzerland
- 721 An alternate approach for deriving rock slope shear strength parameters within weak jointed rock masses
S Narendranathan, S McBeath, K Ayemin, EC Lee, Infra Tech Pty Ltd, Australia
- 731 Author Index