

Slope Stability
in Mining

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Volume One



EDITOR Phil Dight

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Phil Dight

Australian Centre for Geomechanics, Australia

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The Australian Centre for Geomechanics (ACG) was formally established in 1992 as a University of Western Australia not-for-profit research centre in order to promote research excellence and continuing education in geomechanics, with particular emphasis on its application to the mineral and energy extraction sections of Australia's resources industry.

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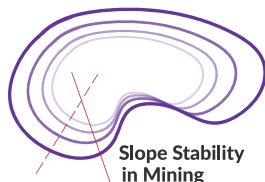


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The dedicated efforts of the peer reviewers have resulted in the high quality of the technical program and the papers compiled for this publication. The editor thanks the following people who contributed their time and expertise as reviewers of manuscripts for the proceedings of the Third International Slope Stability in Mining Conference. A technical and critical review of each paper was undertaken by a minimum of two reviewers for the production of these proceedings.

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Preface

This conference proceedings has an emphasis on specific issues associated with our industry with respect to safety, risk management, detailed monitoring, groundwater issues, data collection, numerical modelling and interpretation.

Ensuring the safety of personnel is the most important task we have. Our industry upholds the highest standards to minimise injury from instability in pit walls and access to the mines. However, we are also fully cognisant of the fact we are dealing with natural materials – the properties of which vary with orientation and are often affected by alteration resulting from the mineralising process, local tectonics and weathering. We need to recognise these challenges and deal with the risks involved.

Why monitoring? It is an essential key along with observational techniques to manage project performance – if you cannot *measure it* you cannot *manage it*.

There are some great advances in slope monitoring primarily based on measuring surface deformation and interpreting mechanisms. Indeed, we see many more operations taking advantage of LiDAR, radar and satellite interferometry. Now we appear constrained by the models used to interpret the deformation. Why?

As an industry, we are still focused on strength, not deformation; although deformation is the only parameter we can measure, whether it is in the laboratory or the field. For instance, the strength we measure in the laboratory comes from strain gauges in a load cell using elastic theory to convert to strength. Limit equilibrium analysis techniques still dominate our design process; however, these do not examine deformation.

Indeed, a significant issue in our design process is that deformation is seldom used to evaluate a design. Yet this is the only measure we have during development and closure that we can use to infer stability. This is a major challenge for our engineers and geologists.

So, without precedent at a new site when we experience deformation in the field which appears anomalous, we do not have the data to better undertake the numerical modelling to initially interpret what this means.

The challenges are compounded when consideration is given to the material properties used in our analysis. Unless we are dealing with known or visible anisotropy, we rarely investigate whether it is a possibility. This has arisen over the last 60 or so years by undertaking laboratory testing largely in the axis of the core, irrespective of the purpose for which the core was originally required. Until we can change the paradigm that the test results obtained in the laboratory are ‘isotropic’, we will continue to only be doing part of our job. The rock does not know that it is meant to behave this way.

Groundwater and surface water affect stability and impose constraints on blasting. The difficulty experienced when removing water has significant implications on successful mining.

Mine closure is something that is left to last. It raises issues of what is behind the wall, in terms of geology/structure, which is often not explored in detail before or during mining, where our focus is on what we can see. More attention is needed in this area. We will be faced with legacy issues (blast damage, weathering, continuing deformation etc.) long after the mine has ceased operation; but long-term monitoring will be necessary after closure.

This conference addresses many of these issues. The majority of keynote presentations were selected from papers submitted and deemed noteworthy by the committee and reviewers.

A conference such as this could not have taken place without the support of the Principal Sponsor PSM and our sponsors and exhibitors. Thank you to all sponsors for your involvement in and your support of the conference series.

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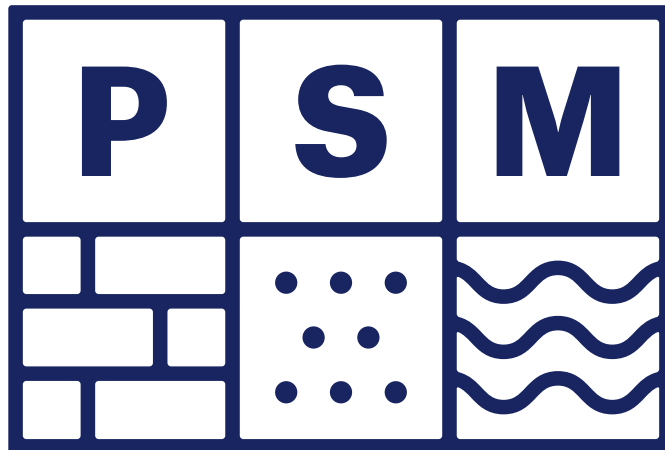
All the people supporting this conference are gratefully acknowledged for their time and efforts.

Professor Phil Dight
Australian Centre for Geomechanics
SSIM 2023 Editor and Conference Chair

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