This annual event gives a platform for our younger (under 35) geo-professionals to present their work, gain feedback from experienced colleagues and become involved in AGS activities. Please support them by coming along to what should be a varied, interesting and exciting evening.

There will be three presentations, each 15 minutes long, with 5 minutes for questions after each talk. The Dr Baden Clegg Award will be presented to the best contribution.

**Prizes**

- **First Place:** Trophy, $500 + a copy of the Australian Geomechanics Journal Collection on DVD
- **Runners up:** $100 + a copy of the Australian Geomechanics Journal Collection on DVD

**This years speakers are:**

**William Darlington (Rio Tinto)**

**Anisotropic Rock Strength and Pit Slope Stability**

**Abstract**

Designing open pit slopes in anisotropic rock masses typical of the Pilbara region of Western Australia is a challenging task. Stability in these slopes is often driven by complex failure modes which are difficult to model accurately using simple limit equilibrium tools while more complex numerical modelling techniques may prove too computationally and time intensive for standard practice.

In this research, the effect of measurable joint and fracture properties on rock mass strength has been examined through the use of experimental modelling techniques and statistical analysis of new and previously published datasets to develop empirical relationships describing the effect of roughness and defect orientation on the strength of a rock mass. Open joints of defined roughness and orientation were subjected to triaxial stress to generate an anisotropic strength criterion. Accuracy and repeatability of joint properties was ensured through the use of a water jet cutting system to cut CAD modelled JRC joint profiles into intact rock. Testing occurred under multiple confining stress conditions to define the criterion over a stress range applicable to open pit slope design. This data was used to create novel empirical strength versus joint orientation relationships, additionally it was analysed using the published relationships of other researchers. It was found that the empirical relationship of McLamore and Gray (1967) yielded an exceptionally good fit to both the experimental data of this research and also a range of experimental data contained in the literature. This finding was consolidated and recommendations have been presented as to the values of appropriate anisotropic fit variables applicable to different rock types and joint roughness. Based on these results a practical methodology for applying this anisotropic strength relationship to the limit equilibrium modelling of anisotropic strength in slope design has been proposed.
Philip Rankin (GFWA)

Construction of Lloyd Street Underpass using Diaphragm Walls

The highlights of the presentation are:

Retaining Bath Structure and Bridge Support for new Lloyd Street Underpass project to improve access to the new Midland Hospital - particularly for emergency services.

Live Railway Corridor for Passenger Trains and Freight liners supporting regional centres and the mining and resources industry. Highly sensitive public service asset with critical disturbance considerations during the construction phase and as a commissioned product.

Project site set on existing buried rail yards with extensive live services throughout the site.

The Primary Geotechnical Scope of works was Two Parallel Diaphragm Walls made up of 57 panels in total with each alignment 170m in length. Six barrettes utilised to support the bridge structures. Panel depths ranging from 12m to 22m with panel widths of 1000mm, 800mm and 600mm.

To facilitate the managing contractors construction staging plan temporary Anchoring were utilised to support the construction loads. These were installed using low headroom drilling rigs. A Temporary Soldier pile wall was also installed to retain the rail corridor during bulk excavation works. High Pressure base grouting of bridge support elements was carried out to ensure settlement criteria under the railways was achieved.

The project utilised a two types of excavating tool, a KL cable operated grab and a KS hydraulically operated grab to carry out the works. The Hydraulic Grab used was the first of its type to be used in Australia and was a resounding success.

4800m³ of concrete poured. 650T of reinforcement tied into 120 cages onsite. Heaviest single cage was 13T and was 21m in length.

James Smith (PSM)

Successful Pit Slope Management in a Challenging Geotechnical Environment – A Case Study

Abstract

Detailed site investigations are essential for understanding the rock mass conditions, major structures and achievable pit slope geometries within an open cut mine. Gaps in the engineering geological model can result in unexpected conditions and therefore difficult mining environments and in some cases; require the need for rapid design modifications. This case study presents an overview of slope performance consisting of eight multiple bench scale failures derived from several modes, including; non-daylighting structures, planar sliding, toppling and potential squeezing. Due to this, real time monitoring of prism and radar data as well as geotechnical mapping inspections forms an integral part in the management of the slope performance during remediation strategies of cutbacks, unloading, depressurisation holes and toe buttresses.

Through a collegial and collaborative approach involving on ground assistance that was supported by rapid design modifications resulted in uninterrupted mining in a safe and efficient manner.