

Blackrock Mining Solutions – Under Ground Drilling Services Provider

Introduction

Blackrock Mining Solutions Pty Ltd has been providing technical services professionals to the Queensland Mining industry since 2008. Since we started, the company has worked across many aspects of mining operations from feasibility investigations, project development and initial drift drive to operational support for existing mines.

In 2010 the company expanded its services to provide specialist drilling services for underground operations.

In particular Blackrock has extensive experience in providing specialist ground consolidation practices using the latest in high strength spiles and resin or microfine grouting solutions for mining through difficult ground. Blackrock Mining personnel have demonstrable experience in achieving the desired mining outcomes in the most difficult conditions in NSW, Queensland and New Zealand operations.

In addition, Blackrock Mining can also provide specialist drilling for gas conformance testing, geotechnical coring and sampling, along with structural definition for faulted ground or other geological features including downhole survey for accurate data representation and analysis.

Drilling Equipment

With the acquisition of two Highlander Series 3 Air-tracks, 3 AFC pan-line face drills and 2 stinger mounted face drills Blackrock Mining can confidently offer to undertake a diverse range of drilling services. In addition to our drilling equipment we have developed and manufactured specialised rods, stabilisers, reamers and bits to ensure a high degree of accuracy.

Air-track and pan-line type drilling equipment have been tried and proven over the past 10 years to be versatile and cost effective for all manner of underground drilling of holes ranging from diameters of 55mm to 250mm, and can efficiently drill to a length of 300 metres.

Drilling can be undertaken at any angle and the small foot print of the equipment means that access can be maintained around the operations. To this effect, drilling projects can be undertaken from sites that may not be suitable for other equipment.

Our drilling equipment simply requires access only to standard mine air lines and water, thus minimising the need for any interaction with mine trades for hook up into other infrastructure and services.



sample location. So the samples comply with the intent of the Qld Act and Regulations.

Equipment Summary

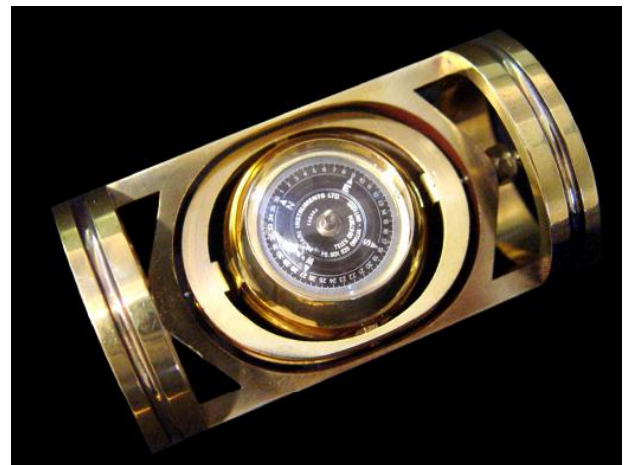
Blackrock Mining survey equipment is a single-shot micro-mechanical borehole surveying instrument that works with the earth's magnetic and gravitational fields.

The system is easy to use and maximizes profits by minimizing capital costs, operating costs and time. This instrument provides both direction (azimuth) and inclination which is used to define the attitude of the borehole at the survey depth. Regular surveys at intervals as the borehole progresses will allow a plot of the borehole to be plotted for three dimensional representation and analysis.

The versatility of the equipment makes it the first choice in mineral exploration, site engineering, mining, and tunnelling operations where ease of use, reliability and economy come first. This is due to:

- ✓ A cost effective solution for continuous or single shot surveying.
- ✓ Up-holes, down-holes, horizontal or inclined holes of any angle can be surveyed without modification.

- ✓ Measurement Range
Inclination $\pm 90^\circ$
Azimuth 0 to 360°
- ✓ Accuracy
Inclination $\pm 0.5^\circ$
Azimuth $\pm 0.5^\circ$
- ✓ No films, batteries, hazardous liquids or other operating expendables are required.
- ✓ There is no need to guess whether the instrument is operating accurately since it can be quickly checked in the field.
- ✓ Very wide operating temperature range with options to further increase the limits.
- ✓ Single shot surveying at the bottom as the hole progresses, identifies hole deviations in time for efficient correction.



Blackrock's Survey tool

Microfine Grouting For Ground Pre-Consolidation

In 2013 we were approached by a QLD operation to develop a system of successfully grouting UIS holes prior to LW mining. The operation was finding that the coal seam structure was significantly damaged around the UIS holes, resulting in falls and delays on the LW. Blackrock's engineers, after visiting the site and observing the problem, developed a system of

pressure grouting the UIS holes via a grout batching plant and pump set up on the surface adjacent to vertical gas riser holes. A suitable high pressure hose is then dropped down the bore hole and connected to the UIS holes. A specialised microfine grout product was developed and tested to ensure



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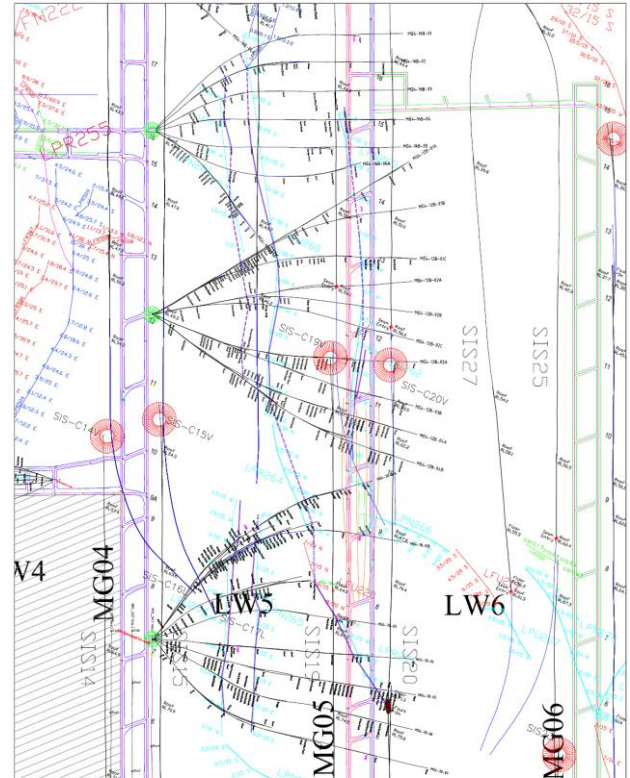
grout stability and flow/penetration could be achieved.

Our method injected grout around the outside of the conduit, allowing the air/gas in the hole to be displaced via the conduit, with pumping to continue until grout return is recorded at the collar of the conduit. At this time the conduit will be closed off and the system pressurised under the static head of the borehole, up to 300 PSI.

Once the system was tested and used on site the resultant grouted ground was mined through and the site LW and Geotechnical staff recognised the potential to use the same system to pre-consolidate a series of significant faults and shears that were bisected by closely spaced UIS holes.

We were then commissioned to use our system to pre-consolidate the strata in zones of known faulting for the entire length of the LW block with significant improvements in strata conditions and a reduction in strata related delays for the LW.

We are now using this system to pre-consolidate coal seams ahead of LW mining at several operations in QLD's Bowen Basin with repeat business at all sites we have operated at.



Typical UIS fan pattern for grout based pre-consolidation

This same system can be used to inject holes drilled using our longhole drilling systems as long as we have access to a riser/drop hole within a few hundred metres. If a riser is not available we can source a pumping system suitable for UG work.



Blackrock Mining's custom built grouting system



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Drilling Services

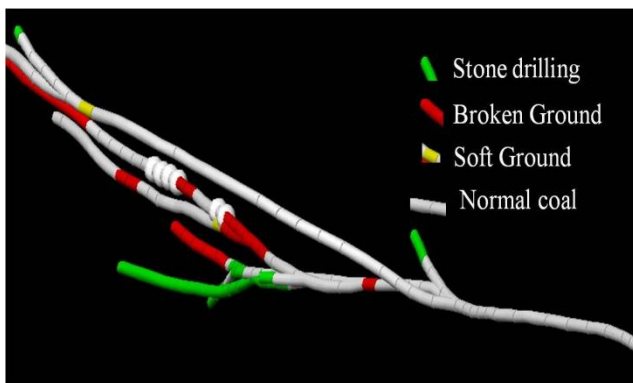
The specialist services that Blackrock Mining can provide are diverse and targeted at solving problems and proving cost effective solutions to geological and geotechnical risk management for underground operations which are currently not available. Some of the other drilling services that we have experience perform are detailed below:

Geological Exploration ahead of Mining

The ability to know the type and location of any structure ahead of mining is a sound risk management strategy. With more mines going deeper and mining reserves which now include structures which in the past may not have been considered, the importance of characterising the ground is vital in understanding the risks and formulating a strategy for successful mining.

Probe hole drilling and surveying of the holes in conjunction with detailed logging of the drilling conditions is a proven cost effective technique for near field exploration.

The return on investment in this type of work is increased by ensuring experienced geologists design the program, log the holes and undertake detailed data interpretation.



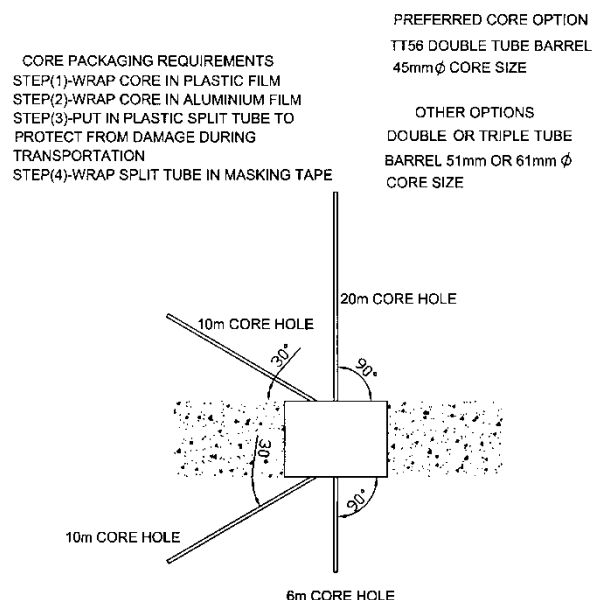
Blackrock Mining also has the tools for data modelling in 3D for incorporation into the mines geological data base, presentation to crews or

management and for integration into hazard management plans.

Geotechnical Coring of Strata

One of the essential services which Blackrock Mining provides is geotechnical coring of strata from within the coal seam.

Drilling from underground allows the mine to gather multiple near-field samples to understand and quantify variations in strata and the geotechnical setting at various locations around the mine in a cost effective manner.



The versatility of the air track allows for samples to be taken at any angle to bedding and from the roof or floor.



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Angled core for bedding plane shear testing is commonly the least sampled, but the most critical parameter for geotechnical characterisation. All core logging and preparation is undertaken by specialist geologists following best practice methods to ensure the data and reporting generate the best value for the effort invested.

Drilling can be targeted for specific features such as intrusions and coal seam contacts above or below the main seam.

The core taken is also a suitable diameter for coal quality testing and confirmation of this for areas where channel sampling can't be undertaken from seams above or below the current target seam

Gas Conformance Coring

In addition to geotechnical coring, the equipment and drilling expertise allows Blackrock Mining to recover cost effective gas conformance samples from fault zones, ahead of the face or from adjacent seams.

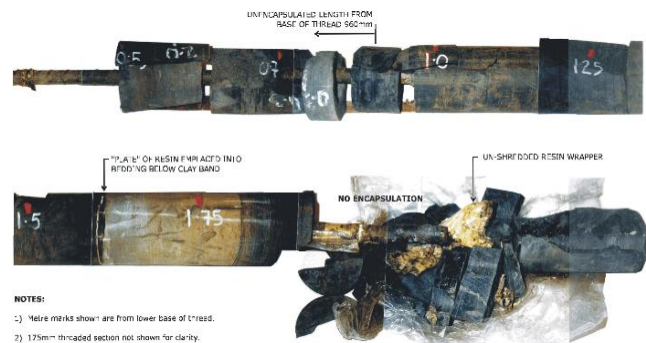
Blackrock Mining staff are trained in conformance gas testing methods.

The ability to survey the location of the sample removes the guess work involved in unsurveyed holes and increases the validity of the conformance results.

Roof Bolt Over Coring for Strata Control Quality Assurance

Over the past 10 years the need for quality assurance for installed strata support has become apparent. Quality assurance is required for OHS and verification of the design assumptions used.

Experience gathered from many mine sites indicates that there are often issues with gloving or poor mixing of resins, along with loss of resin encapsulation into the strata or with broken bolts. Corrosion and stress cracking of in situ support can also be over cored and evaluated with this method.



The results of poor support installation and/or corrosion being roof deformation in excess of the designed criteria, resulting in the need for expensive secondary support or unplanned roof falls.

Bolt over coring is a specialist task and requiring specifically designed barrels and equipment set up.

Blackrock Mining staff have the largest industry experience base in Australia in bolt over coring in a range of strata types. Lengths of bolts recovered range from the standard 1.8 – 2.1m roof bolts to 4m and 6m tendons.

Reporting and analysis by experienced geotechnical engineers is an added deliverable, ensuring the data gathered is valid and implications quantifiable.



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Summary

The aim of Blackrock Mining Solutions is to deliver quality solutions to our clients by providing a full range of specialist technical solutions for your underground drilling and geological and geotechnical investigation requirements.

The services include design and reporting on the investigation undertaken by qualified professionals. Blackrock have good working experience in developing investigation methodologies to deliver any specifically desired outcome in a cost effective manner.

If there are any underground drilling services that you consider that Blackrock Mining Solutions may be able to assist you with please ring or e-mail to discuss.

Contact us

If you would like to discuss Blackrock Mining Solutions capability or how we can assist your project or operation feel free to contact us at r.campbell@blackrockmining.net, or call us on 0439-693-266 to arrange a meeting at a convenient time.