Utilising Acoustic Televiewer Data for Coal Mining Operations

Groundsearch Australia has been utilising Acoustic Televiewer data acquisition alongside other petrophysical and geophysical logging tools for their valued clients in the coal industry for over two decades. These data when combined provide a comprehensive set for interpretation and reporting. Our highly skilled in-house Geology department produce reports of exacting standards for our clients.

Introduction:

Coal mining operations require comprehensive understanding of subsurface conditions to ensure efficient and safe extraction of coal reserves. Acoustic televiewer data, a specialised technology that captures high-resolution images and acoustic measurements of borehole walls, offers valuable insights into the geological structures and features within coal seams. This article outlines how coal mining operations can effectively utilise acoustic televiewer data to enhance resource assessment, safety, and operational efficiency.

1. Data Acquisition and Interpretation:

Acquiring acoustic televiewer data involves running the tool down (more often up) the borehole, capturing continuous imagery and acoustic signals that provide detailed information about rock types, bedding planes, fractures, and other geological features. Our team of trained geophysical operators ensure that optimal data is acquired from field operations. Interpretation of the data requires trained personnel who can analyse these data to identify structural features and orientations.

2. Resource Estimation and Seam Characterisation:

Acoustic televiewer data plays a crucial role in assessing coal seam characteristics, such as thickness, continuity, and quality. By analysing the images, geologists can identify coal seams, determine their lateral extent, and understand variations in seam attributes, aiding in accurate resource estimation and mine planning.

3. Fracture Mapping and Stress Analysis:

Understanding the orientation and distribution of fractures within overburden, interburden and coal seams is essential for both safety and resource extraction. Acoustic televiewer data enables the identification of fractures, faults, and joint patterns.

Stress analysis through an overstress study to identify stress field and maximum stress computation to classify magnitude and orientation.

Breakout analysis is necessary as breakouts can coincide with rock stress orientations.

The transit time of the acoustic wave which is measured in microseconds yields variations in borehole dilation equivalent to less than 1mm variation in the borehole diameter can determine ovality within the borehole.

This information helps engineers and geologists assess the potential for roof collapse, gas migration pathways, and groundwater ingress, contributing to safety protocols and extraction strategies.

4. Geotechnical Assessments:

The acoustic televiewer data can provide valuable geotechnical information for slope stability analysis, tunnelling, and pillar design. By studying the orientation and spacing of geological features, mining engineers can assess the potential for ground instability and design appropriate support structures.

5. Ventilation and Gas Monitoring:

Understanding the permeability and connectivity of fractures is crucial for managing methane gas emissions in coal mines. Acoustic televiewer data aids in identifying pathways for gas migration, assisting in designing effective ventilation systems and preventing potentially hazardous gas accumulations.

6. Operational Planning and Efficiency:

Integrating acoustic televiewer data into operational planning can enhance mining efficiency. By accurately mapping coal seam boundaries and structural features, mining operations can be optimised to minimise waste rock excavation and improve coal recovery rates.

7. Challenges and Best Practices:

While acoustic televiewer data offers numerous benefits, challenges such as image interpretation variability and data integration exist. Implementing best practices, such as proper tool calibration, comprehensive training, and collaboration between geologists and engineers, can enhance the accuracy and reliability of data interpretation.

8. Future Trends and Innovation:

As technology advances, innovations such as automated image analysis and integration with other geophysical techniques hold the potential to further improve the utilisation of acoustic televiewer data in coal mining operations.

Conclusion:

Acoustic televiewer data has revolutionised coal mining operations by providing a detailed view of subsurface structures and features. By leveraging this technology, coal mining companies can enhance resource assessment, improve safety measures, optimise extraction strategies, and contribute to more sustainable and efficient mining practices. As the coal mining industry continues to evolve, acoustic televiewer data will remain a vital tool for ensuring the success and longevity of mining operations.

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