Automatically detecting coal seams

Maptek™ Eureka™ allows users to fully exploit LAS and MWD (measurements while drilling) data for building accurate coal strata models.

LAS data

Recent development in Maptek™ Eureka™ uses downhole geophysics to automatically detect coal seams.

LAS data relating to drillholes is imported, and parameters are set to auto assign downhole intervals based on the change in properties of differing material types. Coal is generally less radioactive than its host rocks and softer than overburden, making it identifiable using gamma and density logs.

It is therefore possible to automate what has been a time consuming manual process. Single or multiple traces can be viewed beside the drillholes in 3D *(image 1)*, providing confidence in the method. Once the seams have been identified automatically, manual edits can be performed easily using on-screen handles *(image 2)*.

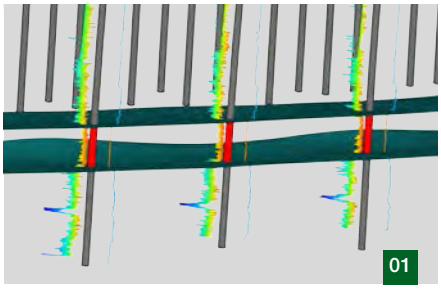
Using the geological modelling tools in Eureka, roof and floor surfaces of each seam can then be created to give an accurate reference for charge placement in Maptek™ Blastlogic™.

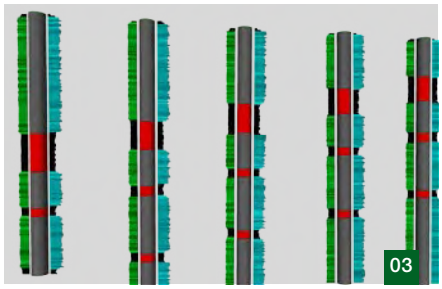
The limitation of the process for generating accurate coal seam models from downhole information is that the holes still need to be geophysically logged, which costs money and takes time.

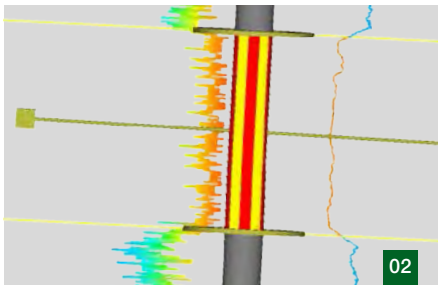
MWD data

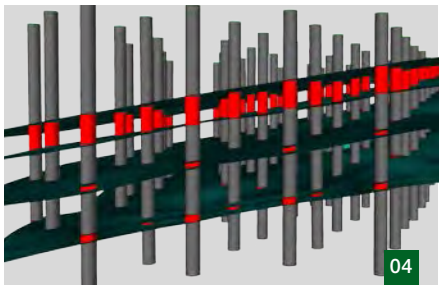
Automatic modelling of downhole intervals minimises the need for additional logging.

Drill automation systems on rigs capture vast amounts of data for every hole drilled. This data is largely unused for mine planning. However it contains valuable information that can be used for strata recognition.









01 Automatic strata recognition using gamma and long-spaced density logs; interpreted coal seam in red.
02 Handles can be used to adjust an interval to match trace.
03 Automatic strata recognition using MWD logs; left green trace is weight on bit and right blue trace is torque.
04 The interpreted seam interval in red can be used to create accurate coal surfaces.

Telemetry data such as pull down pressure, air pressure, drill bit rate and torque are recorded while drilling. Similar to the gamma traces produced when logging, these variables change as the hole is drilled through different strata. Denser lithology requires more energy to drill through, while coal seams require less energy *(image 3)*.

MWD data can be visualised in Eureka, analysed and converted to strata models.

On average, every fifth blast hole is geophysically logged, at $100 to $150 per hole. A typical blast on a strip mine has about 800 holes. An operation could save up to $24,000 per blast, as well as 4 to 5 days of logging from the drill and blast schedule (assuming 12 holes/day).

Removing the need for geophysical logging takes people away from the pit, improving safety for blast crews. Along with the immediate and tangible cost benefit, building a coal surface from every hole drilled in the pattern, rather than every fifth hole, gives a clearer account of the resource *(image 4).* Data is available earlier with MWD than LAS, resulting in a faster turnaround for modelling.

For through-seam blasting the method allows accurate charge placement in Blastlogic and loading for every single hole, leading to less coal damage and greater recovery.

Email vulcan.sales@maptek.com.au