In search of black gold

Since man first started searching for minerals and precious metals, three key factors have proved decisive for success: time required, the cost of getting the job done and the quality of samples brought to the surface for analysis. The same factors have proved effective for the success of Rio Tinto's mine operations.

Rio Tinto dominates Australia's coal industry, among other players. Mount Thorley, one of Rio Tinto's coal properties, operates two open cut mines in the Hunter Valley region of New South Wales. The operation supplies international and domestic markets with up to 10 million tonnes of semi-soft coking coal and thermal coal per annum.

Mount Thorley is an open pit coal mine where the coal is excavated in a series of layerslayers, known as benches. Benches allow large vehicles to enter the site and allow drilling at different levels. Coal mining is preceded by extensive sampling to profile the geology and position of the coal seams. Mount Thorley uses Reverse Circulation (RC) exploratory drilling for initial exploration and sampling of coal seams down to the depth of 300 m.

Reverse circulation is an economical way of drilling boreholes to get down to where the seam is located. It also allows for large borehole drilling at faster rates. The RC method employs dual wall drill rods with an inner tube located inside the drill rod. The inner tubes provide a sealed pathway for the drill cuttings to be transported from the bit face to the surface. The circulating medium, in most cases is high pressure air. The air powers the drilling tool and the exhaust air carries the sample cuttings out to the surface.

The sample collection is of paramount importance in RC drilling. The samples are extracted in the form of 'chips'. At Mount Thorley, the holes are drilledwith diameter from 6 to 4.5 inches. The sample chips collected from every 1m is inspected by geologists to understand the deposit and the nature of the coal underneath. After locating the coal seam at a depth of 300m, it switched to Diamond Core drilling to extract sample 'core' for in-depth analysis of the quality of the coal. The core is extracted from every inch drilled and analyzed. Diamond core drilling is preferred beyond these depths to salvage samples in the form of core. The core drilling technique does not use compressed air to eject the sample core as in RC drilling.

It's absolutely critical that the compressors used in RC drills need to deliver fast performance over long periods. Air compressors must supply increased pressures that are needed to ensure the removal of sample cuttings from large and deep boreholes, and in most difficult strata. With a large number of trucks involved in transporting the coal out of the mine, the bottom of the 'pit' can be very congested environment. The air compressors must be mobile as well.

Elgi diesel skid-mounted compressors have been in use for RC drilling at Mount Thorley Elgi's two-stage rotary screw compressors are ideally rated for RC drilling and require low engine power leading to significant fuel savings. The compressors at Mount Thorley have an output of 900-1100 cfm at 350 psi each.

Elgi makes a range of diesel-powered screw air compressors for the different combinations of bore diameter and depth that are encountered in diverse rock conditions. With a wide range of reliable compressors, Elgi continues to be an active partner in the construction & mining industry.