



Case Study

Basic Design of the Bucket Wheel Excavator for the Goonyella Mine

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Overburden stripping at Goonyella Mine has already reached the stage where drag lines alone cannot handle the depth or achieve the production targets required without the aid of additional (pre-stripping) equipment. Currently, a fleet of twelve scrapers is being used for this purpose but long term planning indicates an ever increasing need for pre-stripping, to such an extent that more sophisticated, more efficient systems will be required early into the 1980s.

Investigations of options available for this pre-stripping showed a continuous system, i.e. Excavator-Conveyor- Spreader, would be the most attractive. This would mean introduction of entirely new plant types and related operating methods to the Central Queensland mines. Similar systems have operated for many years in Victoria and overseas, however, these existing systems are in deposits much less consolidated than those at Goonyella. Soil investigations suggest a continuous system will meet some of the most arduous conditions yet encountered by this type of plant. Consequently, extensive investigations have been made to judge whether a suitably designed Bucket Wheel Excavator (BWE) could be obtained for Goonyella, and, this being so, in drawing up the specification of the machine and associated transport and disposal units.

The open cut coal mines managed by Utah Development Company (UDC) in Central Queensland use the drag line stripping system, as developed in North America, to expose the coal seams. The coal is excavated by a heavy duty shovel and loaded into wheeled transport. To date, typical over burden (O/B) depths are 35 - 45 m and even with the high rehandle rate necessary at these depths stripping with drag lines is highly efficient (Runge, 1979). However, the coal seam dips at some 5° and the corresponding increase in O/B depth as mining progresses necessitates increased rehandle by the drag lines. Stripping by drag lines alone would then become inefficient and at depths over 45 m a tandem system for stripping is required. The options open to UDC for pre-stripping included scrapers, shovels and trucks, a semi-continuous system using shovels, crushers and conveyors, and a fully continuous system.