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World's largest mineral crusher is powered by ABB

Electrical control and distribution systems supplied by ABB have been installed in the world's largest mobile mineral sizer, which has recently been assembled in Australia from modules shipped from the UK and manufactured in Australia from UK designs.

Constructed by Mining Machinery Development Ltd (MMD) of Derby, the 17,600 tonne track mounted machine, known as the MMD 1400 Mineral Sizer, has been built for BMA for use at its open cast coal mine at Goonyella in Queensland, Australia. Designed for a throughput of 10,000 tonnes per hour, the machine will be used to clear the rock covering the coal, known as overburden.

Clive Spencer, Projects Director with MMD, says: "We chose ABB because it is a world renowned supplier of electrical equipment. The ABB name carries a lot of prestige with our customers and also reflects well on us as we are seen to be using the best. Also, ABB can provide maintenance support all over the world, which allows us to give excellent back up to our customers."

The mobile sizer is completely electrically powered and driven and can be supplied with power either from a 4MW, 6.6kV umbilical cable up to 1 km long or from a generator for maintenance purposes.

ABB has supplied the full electrification system for the sizer, including the incoming 6600 V switchgear, outdoor mounted Resibloc three-winding step down transformer and low power distribution.

The mineral sizer operates alongside a mobile electric shovel, which transfers 3m³ bites of material into the sizer's hopper up to 100 tonnes at a time. From there, an apron feeder lifts the material to the sizer itself, a 3-toothed mineral sizer, which reduces the material to lumps of rock around 350mm³.

The material is then transferred, by the outfeed conveyor to a slewing discharge conveyor, which takes the material to the hopper car of an overland conveyor. The overland conveyor takes the material, up to 10 km, to a spreader for disposal. When the shovel has cleared an area around the sizer, the machines move on to another location to clear further strips of overburden.

The various components of the sizer are all powered by ABB drives and motors – two 430 kW propelling drives, with brake motors and shared inverters, two 430 kW drives for the sizer, two 430 kW drives for the apron feeder with brake motors. One 430kW drive for the discharge conveyor with brake motor, one 250kW drive for the transfer conveyor and a 90kW hydraulic power AC drive.

The drives are ABB ACS 600 MultiDrives. These incorporate an inverter supply unit to give them a regenerative capability, used to brake the machine and allow it to move up and down inclines of up to 10 degrees and also has regenerative braking, allowing the discharge conveyor to carry material downward without running over speed.

All the drives are marine standard, designed to withstand any vibration movement caused by the mineral sizer.

Graham Smith, ABB Project Engineer for the electrical part of the contract said: "Variable speed drives were chosen for the sizer because of their soft starting capabilities, as the electrical network at the mine did not have the capacity to supply the current that direct-on-line starting would draw".

All motors used on the sizer were supplied by ABB. These are mainly HxR machines, with cast iron construction to withstand the vibration and enclosed to stop the ingress of dust.

A major part of the contract was the fitting of the drives and associated distribution equipment into air-conditioned housings. Based on three standard ISO shipping containers, these were customised for the application by coating them with a high grade UV coating in order to withstand the 46° C ambient temperature experienced at the mine.

One of the containers, house a large MCC and MV switchgear, while the other two are stacked above each other and contain the ABB drives, connected by a 1kV DC busbar. These containers are fitted with an air handling and cooling unit to deal with the 120 kW heat load developed by the drives.

The containers are maintained at a positive pressure relative to the outside, to prevent the ingress of dust. All are also fitted with filtered fans, fire detection and extinguishing system and small power and lighting.

ABB supplied the control system for the mineral sizer. The machine can be controlled manually, through a SCADA system, or remotely via radio.

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Caption: The world's largest mobile mineral crusher, used in open cast coal mining in Australia, is an all electrical piece of machinery, powered by ABB drives and motors.

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