Beneficial Use Case Study

Medupi Power Station

Coal Combustion Product Type
Fly ash

Project Location
Lephalale, South Africa

Project Participants
Eskom, Ash Resources, Hitachi Power Europe, RDE, Murray & Roberts, DB Thermal, Aveng, Concor, Grinacker

Project Completion Date
2020

Project Summary
Medupi Power Station is a dry-cooled, coal-fueled power station under construction by Eskom, a South African state-owned utility that is the largest producer of electricity on the continent. Initially conceived as a three-unit 2400-MW plant, it is now designed to accommodate six units for a capacity of 4764 MW, which will make it the fourth-largest coal-fueled power plant—and the largest direct dry cooling plant—in the world when it is fully brought online. It is the first baseload coal-fueled power station to be built in South Africa in over 20 years and has a planned operational life of 50 years.

Project Description
Building a power plant the size of the Medupi Power Station required over 650,000 cubic meters of concrete. Johannesburg-based Ash Resources ultimately supplied over 75,000 tons of classified fly ash from its Matla plant, located roughly 280 miles from the construction site near Lephalale, in South Africa's Limpopo province.

The primary challenge was to deliver the required high volumes of concrete while managing the heat of hydration during mass placements, as many of the structures were monolithic in nature. For example, the turbine building housed a foundation mat of up to four meters deep, meaning the concrete placement had to be carried out continuously to avoid the formation of cold joints. Owing to the large number of concrete bases being placed virtually simultaneously, a fleet of 39 truck mixers was used to feed up to eight pumps, with a load of concrete delivered to a placement point on average every four minutes.

Concrete designs varied, with most based on a 70/30 CEM I/Dura-Pozz Pro fly ash mix. The use of fly ash helped not only to control the heat of hydration, but also to ensure peak temperatures occurred at a later stage. The use of a 40% fly ash mix was also used to help control temperatures in the larger mass placements of concrete. Fly ash further played a key role in optimizing the concrete mixes to meet exacting shrinkage specifications and create a denser, less permeable concrete capable of resisting abrasion and chemical ingress—key performance criteria when designing for a 50-year lifespan with minimum maintenance.

Ash Resources received a *Construction World* 2013 Best Projects Award in the Supplier category for its work on the Medupi project.

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