

ASH BENEFICIATION FOR THE ENHANCEMENT OF ELECTRICAL TRANSMISSION INFRASTRUCTURE

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Coal Ash Beneficiation is a government imperative for South Africa and Eskom generates approximately 34 million tons of coal ash annually, from their 14 pulverised coal fuel plants.

One of the broadest reaching coal ash beneficiation applications is that of coal ash alkali activation (AA) to form concrete and grout type products. However, conventional AA utilises hazardous activation chemicals, which limits the commercial application thereof.

To date, Eskom's coal ash beneficiation research has focussed on fresh coal fly ash, either classified or not. However, AA can be conducted utilising dumped ash (80% fly ash and 20% coarse ash), availing a large volume of, previously unused, coal ash.

Although there are several possible applications for this technology, this paper will concentrate on 3 applications. The use of coal ash-based, AA coal ash shotcrete for pylon and gabion metal protection, production of Lego-shaped, AA coal ash concrete Stay-blocks and the production of AA concrete poles. AA shotcrete allows for the spraying of the product onto the metal components of pylons and gabions. Initially, to passivate the metal, limiting corrosion and secondly to act as an anti-theft mechanism of the metal components, due to an inability to cut the AA coal ash concrete.

The shotcreting process also allows gabions to be linked together, limiting the shifting or removal of the stones or basket.

AA coal ash concrete Stay blocks have been produced and will now be cast in Lego-shaped moulds which can be linked together without the need for cement. These blocks are used for pylon stabilisation during maintenance or when pylons are at risk of toppling due to compromised foundations.

AA coal ash concrete, 9 and 11m transmission and distribution poles will be used to replace the wooden poles currently used. Wooden poles can be negatively impacted by water, pests and fires which limits their service design life. AA coal ash concrete poles will mitigate these risks, increasing service life and minimising environmental impact.

The research of these technologies will be conducted as demonstrations on transmission sites, using dumped coal ash and user-friendly activators to conduct the AA. Formulations, for the different applications, will be conducted in the laboratory, to ensure setting times, strength (compressive and flexural), flowability and density of the different products.

Visual inspections will be conducted on the demonstration sites (Shotcrete) after application and the Stay blocks and poles will be subjected to testing in the industry applicability laboratories (Tower Testing Site).