

A New Fly Ash Separator Combining Magnetic Forces with Air Drag

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Abstract

This paper describes EXPORTEch's new dry fine particle separator (patent pending) and discusses separation results. Fine particles (such as fly ash which has mean particle sizes below 60 microns) are unique because their high surface area to volume ratio makes them subject to small surface forces such as air drag, electrostatic forces, and moisture agglomeration. These can dominate over other forces and are often difficult to control. EXPORTEch's new separator takes advantage of the response of fly ash to both magnetic forces and gas drag. The magnetic forces hold ferromagnetic and strongly paramagnetic particles in place while air or another gas blows away the less magnetic particles. A hood collects the weakly paramagnetic and diamagnetic particles which are pneumatically conveyed to a cyclone that removes them from the air stream. EXPORTEch has successfully separated three different products from various fly ashes: fly-ash-derived-magnetite which could be sold as a substitute for commercial grades of magnetite used in heavy media coal cleaning circuits, fractions with less than 4% Loss-On-Ignition (LOI) which can be sold as admixtures to the cement manufacturing industry, and 2.20 or lower specific gravity fractions which can be used in the manufacture of low density cement blocks and aggregates.