

ProAsh[®] Beneficiated Fly Ash For High-Performance Concrete Construction

Innovative Process and Material: Fly ash plays an important role in producing high-performance, durable, long-lasting concrete. The concrete industry is facing a shortage of high quality Class F fly ash due to recent Clean Air Act legislative regulations that have caused undesirable high and variable carbon contents in the fly ash. Separation Technologies, Inc. (STI) has developed a patented, commercially viable, innovative process and equipment to remove excess carbon from fly ash. With this extraordinary, energy efficient technology, an unusable high carbon Class F fly ash can be economically processed to produce a consistent, low carbon (beneficiated) fly ash, ProAsh, that is suitable for use in concrete. ProAsh is made commercially available to the concrete industry through a collaborative effort between STI, Master Builders, Inc., and Roanoke Cement Company.

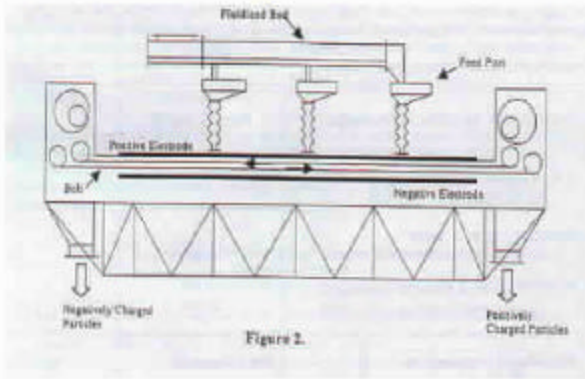
Development: The development of the STI separator equipment began with work on separating sulfur-bearing minerals from coal to reduce acid rain, based upon the electrical properties of the material. This work inspired thought of charging particles that could be attracted towards an electrode and then swept away using a moving belt. The STI state-of-the-art processing equipment uses the principle of tribo-electric charging and electrostatic separation to separate and remove carbon particles from fly ash. The processor, shown in Figs. 1 and 2, receives feed ash directly from storage silos at electric utilities operating coal-fired power plants. The processor then uses electrodes to cause the carbon and mineral fly ash particles to assume opposite charges so that they can be separated. The process and technique employed by STI does not alter the fly ash itself except for the removal of carbon from highly variable to approximately 2 % as shown in Fig. 3. This patented process is clean, environmentally friendly, efficient, and costs a fraction of what other carbon removal processes (carbon burnout, froth floatation) cost. Prior to the development of this technology, there was no widespread, commercially proven method of carbon separation from fly ash.

Industry Impact: Today, ProAsh beneficiated fly ash has been a proven commercial success in power plant locations in New England, North Carolina, and Maryland. It has been used in high-performance concrete in beautiful structures such as the Ardmore Area High School, Glenardum, MD, Harundale Mall, Pasadena, MD, St. Mary's Courthouse, Leonardtown, MD, and Cross Creek Development, Beltsuicco, MD, to name a few. The demand for this technology is growing considerably as power plants are searching for cost effective methods of handling and treating otherwise unusable fly ash. It is expected that in the next few years, this innovative process will become the preferred method for coal-burning power plants to remove carbon from fly ash.

The availability of ProAsh has changed the construction industry by providing numerous benefits to concrete producers, contractors, engineers, and owners that include consistent air contents and better quality control of fly ash treated concrete mixtures. Concrete producers and contractors benefit economically from this high quality product. Engineers and owners like the fact that concrete treated with ProAsh has superior and predictable in-place concrete performance. In addition, high carbon containing fly ash is typically unusable in concrete and put into landfills as a means of disposal. Processing undesirable high carbon fly ash to produce ProAsh is reducing waste, preserving landfill space, and alleviating the demand on cement that will either reduce cement production or the need for constructing new cement manufacturing plants. The overall effect will be sustained or lowered CO₂ emissions released into the atmosphere, reduced energy demand, and more efficient utilization of natural resources.

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Figs. 1 and 2: Schematic drawing and photo of the state-of-the-art tribo-electric processor for removing carbon from fly ash to produce ProAsh.

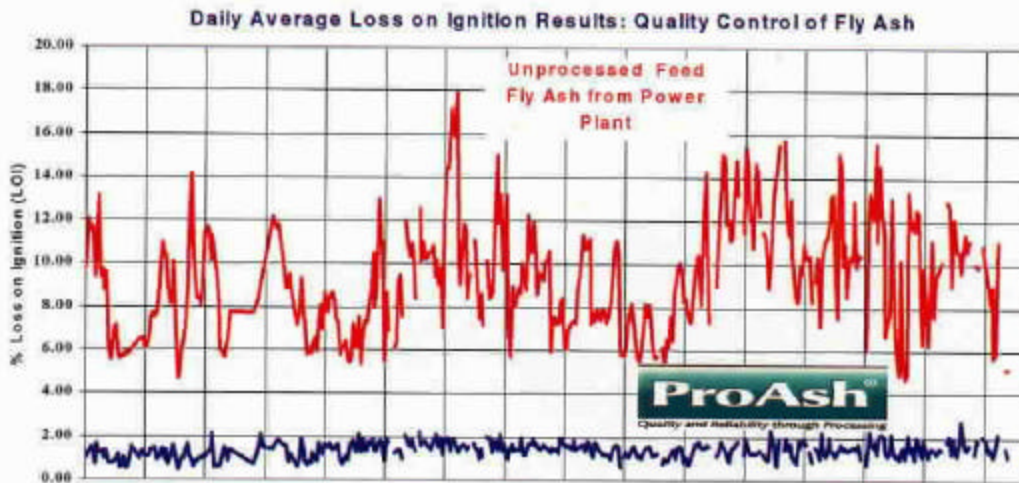


Fig. 3: Illustration of the high quality, consistent, ProAsh that is produced using the innovative carbon removal process.