

## Case history

# Milling and classifying for a more efficient sorbent

A distributor installs a new classifier milling system to provide customers with a better product.

**D**ry-sorbent injection systems are used primarily in coal-fired power plants to help reduce sulfur and mercury emissions and meet government regulations. Sodium bicarbonate (SBC) is one of many sorbents used in dry-sorbent injection systems to help with air pollution control. The systems inject the SBC into the plant's flue gas stream, and the fine white powder attracts the pollutants and neutralizes them so they can be disposed of safely.

Owensboro Riverport Authority (ORA), Owensboro, KY, operates one of the largest SBC processing plants in the world at the company's Harbor Road Terminal facility. Located on the Ohio river, the facility was chosen by Solvay Chemicals, an international chemical supplier, to process SBC for delivery to regional coal-fired power plants. To meet the chemical supplier's processing requirements, however, ORA needed to install a turnkey solution to help mill and process the SBC.

### Smaller particles equal better results

To maximize the pollution absorption in a dry-sorbent injection system, companies reduce the SBC particle size, which provides a greater surface-area-to-mass ratio and allows more interaction between the SBC and the pollutants in the plant's flue gas stream. Combined with a large throughput, uniform, very fine SBC particles improve dry-sorbent injection system efficiency and help plants comply with environmental regulations.

To meet the chemical supplier's requirements and provide the end-user with the most useful, efficient product, ORA needed a way to mill, and then classify, the SBC for a consistent, smaller particle size distribution at the Harbor Road Terminal processing facility so the customer would receive the material in optimal, ready-to-use condition. ORA needed a multi-line system that could process SBC efficiently on both an hourly and a 24-hour shift basis. To meet the



The ORA installed five complete classifier milling systems, each of which included the silo, conveying lines, classifier mill, and all other necessary equipment to process the sorbent.

client's specifications, the SBC needed to be milled to a consistent particle size of d90 less than 25 microns (90 percent of the particles smaller than 25 microns). For comparison, a human hair is about 75 microns in diameter.

### A classifier solution

The company contacted Classifier Milling Systems (CMS), a powder processing equipment supplier based in Brampton, ON. The supplier recommended that the company install several air classifier milling systems to both mill and classify the SBC in one efficient step.

"The project was on a short timeline," says Brian Wright, president and CEO of ORA. "We leaned on Solvay Chemicals to recommend the best path forward for equipment supply. CMS accepted the short timeline and delivered as needed."

ORA decided to install five air classifier milling systems, each with an air-swept classifier mill, a high-efficiency cyclone, a dust collector,

an industrial fan set, and a control panel. Each system is fed from a storage silo by gravity through a rotary airlock into a stream of conveying air. The conveying air then carries the SBC via an injector to the impact mill's grinding chamber, where high-speed rotating hammers impact the particles and mill the material to the desired particle size. The airstream carries the milled material from the grinding chamber to the mill's air classifier wheel, which is designed to allow particles small and light enough to be carried in the airstream through the classifier wheel and exit the mill while rejecting oversized particles back to the grinding chamber. Adjusting the classifier wheel speed allows operators to control the final particle size before the material leaves the mill. The milled material is then conveyed to the cyclone and dust collector to be separated from the airstream.

### Creating a consistent, better product

The air classification mills were designed specifically for the SBC product and schedule that ORA

required. The installation included the silos, conveying equipment, and everything else that ORA required to process the material. Additionally, the company is able to use the systems' controllers to adjust the material's particle size distribution without shutting down the system.

"From our operating perspective, we needed a reliable and sustainable system while minimizing maintenance cost," Wright says. "The mill system has worked as planned."

Combining milling and classification into a single step reduced the amount of space required for processing equipment, allowing all five systems to be installed side-by-side without the need for separate classification equipment. While compact, the turnkey systems provide efficient, accurate SBC milling and classification so ORA can meet its customer's material quality and production requirements. **PBE**



**Note:** Find more information on this topic in articles listed under "Screening and classifying" and "Size reduction" in *Powder and Bulk Engineering's* article index in the December 2016 issue or the Article Archive on *PBE's* website, [www.powderbulk.com](http://www.powderbulk.com). (All articles listed in the archive are available for free download to registered users.)

**Classifier Milling Systems**  
Brampton, ON Canada  
905-456-6700  
[www.cms-can.com](http://www.cms-can.com)

The new system allows ORA to mill and classify the material in one step, ensuring the sorbent is at its most efficient size for the end-user.