FCM CLASSIFIER MILL

Flue Gas Desulfurization

APPLICATION BULLETIN

BACKGROUND/ CHALLENGE

A power plant in Illinois sought a cost effective way of reducing its sulfur dioxide emissions. When fossil fuels are burned, they have a tendency to release high amounts of sulfur dioxide in the atmosphere - the pollutant is primarily responsible for acid rain. Through a process called **flue gas desulfurization**, sulfur dioxide is removed from emissions thus reducing a plant's pollution rate. Flue gas desulfurization is accomplished using a procedure called "**dry sorbent injection**."

Dry sorbent injection is the insertion of chemicals into fossil fuel emissions to minimize the amount of sulfur dioxide entering the atmosphere. One of the chemicals capable of reducing sulfur dioxide is sodium bicarbonate (SBC). SBC absorbs the sulfur dioxide in such a way that the amount of sulfur dioxide released into the atmosphere is reduced. However, in order for sodium bicarbonate to effectively absorb sulfur dioxide, it needs to be ground into very fine particles

STURTEVANT PERFORMANCE

Thorough testing at the Sturtevant lab identified three minerals capable of successfully absorbing sulfur dioxide and other acidic pollutants present in the gaseous products of fossil fuel combustion: limestone, trona (sodium carbonate) and sodium bicarbonate. While limestone offered a good sorption ability, it only did so at temperatures around 850°C. Sturtevant's lab found that trona and sodium bicarbonate worked at much lower temperatures (140–300°C). In this temperature range, the sorption ability of sodium bicarbonate was much higher than trona. Also, at the same temperature and contact times between the sorbent and gases containing sulfur dioxide, sodium bicarbonate had a much higher conversion rate resulting in lower costs to the customer.

EQUIPMENT RECOMMENDATION

STURTEVANT'S FCM CLASSIFIER MILL

The FCM Classifier Mill is a high speed impact mill with an internal air classifier. The material enters the grinding chamber through the feed inlet where it comes into contact with a series of spinning impact pins or blocks smashing the material into fine particles. The fine particles must pass through a cage of spinning blades, known as the “classifier wheel”. The wheel acts as a screen and only lets the particles that are small enough to pass through, it also rejects the large particles causing them to stay in the mill for additional grinding. The fine particles then exit the mill and are collected in a bag house product collector. Particle size is easily adjusted by increasing or decreasing the classifier speed, without mill shutdown to achieve the desired PSD. Other system parameters are easily adjusted to allow for tight control of product size for grinding and classifying of a variety of materials.

The lab knew immediately that the Sturtevant FCM Air Classifier Mill was the machine best capable of achieving the particle size needed to absorb sulfur dioxide. The FCM Air Classifier is a classifying impact mill capable of reducing powders down to 10 microns. It is fast becoming the workhorse in particle size reduction applications due to its combination of impact milling and air classification technologies in a single unit. The FCM’s flexibility of operation allows it to easily process a multitude of product categories requiring efficient and economical particle size reduction for a broad range of industries including pharmaceutical, food, chemical, mineral and others.

SUMMARY

The Sturtevant FCM Classifier Mill was able to achieve a sodium bicarbonate particle size which successfully contacted and absorbed sulfur dioxide. In fact, the plant was so pleased with the performance of Sturtevant's FCM Classifier Mill, they had eight (8) machines installed. Further, as a customer of Sturtevant, the Illinois power plant was now able to avoid costly maintenance delays and downtime by utilizing Sturtevant's Field Service experts and replacement parts options.