

Case history | New pins bring added abrasion resistance to agglomerator

A bentonite processing facility switched to more robust pins to cut back on maintenance time.

Black Hills Bentonite, Casper, WY, mines and processes sodium bentonite and lignite at several facilities. Depending on how bentonite is processed, the end product can be used in a wide range of industries, including drilling applications, metal casting, environmental and civil engineering applications, and as an absorbent.

Pelletizing bentonite

Due to the material's highly absorbent characteristics, pelletized sodium bentonite can be used in cat litter production. One of Black Hills Bentonite's plants has been producing material for cat litter since 1990 with the help of a Mars Mineral pin mixer (also known as a pin agglomerator).

The pin mixer is a high-speed, high-energy processor that compacts particles into small agglomerates or pellets. The unit has a long,

cylindrical shell with a shaft in the middle with radially extending rows of pins attached. The pins are arranged in a double-helical pattern that's staggered and overlapping to ensure uniform particle processing.

The raw, mined bentonite is sent through a rotary dryer and then enters the pin mixer along with a fine spray of liquid as a binder to aid in the agglomeration process. The material is whipped around by the pins as the bentonite moves through the shell. Once the bentonite is compacted into small pellets, the material exits the pin mixer and is screened before moving on for further processing. Material that doesn't pass through the screens is recycled back into the process until it fits the company's specifications.

While the pin mixer has remained in place for more than 30 years, the pins that move the material around inside the mixer have



This pin mixer has been in operation at Black Hills Bentonite for more than 30 years. The company recently switched to new pins to increase time between maintenance.

changed several times over the years as Black Hills Bentonite has looked to increase the process efficiency by minimizing downtime.

“We had tried several different pin materials over the years, including tungsten carbide, which didn’t help as much as we had hoped,” says Andy Mills, assistant general manager at Black Hills Bentonite. “Then we did some trial runs with some new pins and saw our downtime drop considerably.”

The pins were tested on-site during the course of normal processing operations. Both Black Hills Bentonite and the supplier were able to monitor the wear on the pins and the product quality to find the right fit for the application.

New pins reduce maintenance time

The old pins that the company used in the pin mixer had a tungsten



The pins spin inside the mixer, pushing the material together with the binding liquid to create the final product. The new pins are covered in a nickel matrix cloth with tungsten carbide chips.

carbide tip and required approximately 4 hours to change out. The new Flexwear pins have improved wear resistance and are covered in a nickel matrix cloth with tungsten carbide chips. The new pins are also approximately 0.02 inches larger in diameter. The pins are proprietary and made exclusively for the supplier’s pin mixers.

“Before we changed to the new pins, we were going in every couple of weeks. It’s a little bit hard to tell how much we’re saving from a downtime aspect, but it’s significant.”

“At first, checking the pins for wear was done visually, but by now we know that after about 1,500 hours we need to go in and do a change,” Mills says. “Before we changed to the new pins, we were going in every couple of weeks. It’s a little bit hard to tell how much we’re saving from a downtime aspect, but it’s significant.”

The new pins are more expensive and require the same amount of time to replace, but the longer use period has been a major benefit for Black Hills Bentonite.

Black Hills Bentonite has worked closely with the supplier to continually improve the mixer’s performance and the plant’s efficiency. Over the years, the company has sent many photos of the pins’ wear pattern to the supplier for evaluation and to determine if other options may be available.

“We have a consistent amount of hours for changeouts, and we can count on good performance with the regular maintenance,” Mills

says. “I’m pretty happy with what we’re doing right now.” **PBE**

For further reading

Find more information on this topic in articles listed under “Agglomeration” and “Abrasion resistance” in *Powder and Bulk Engineering’s* article index in the December 2019 issue or the article archive on *PBE’s* website, www.powderbulk.com.

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The pins are arranged in a double-helical pattern to ensure uniform particle processing.