Stainless steel separator proves its mettle at classifying abrasive ferrotitanium granules

Ferrotitanium is a metallurgical alloy used to make steel more ductile, i.e., more readily formed into thinner automotive body panels or appliance cabinets. But, ferrotitanium is an abrasive material that can tear up process equipment in the plants where it is produced.

Global Titanium Inc. is one of the world’s top 10 producers of ferrotitanium, supplying it in granular form for shipment to steelmakers, but the product was literally tearing holes in the screen separator used to classify the granules by size. The problem was solved after Global installed a new stainless steel separator made by Kason Corp. (www.kason.com).

Global Titanium buys titanium scrap and blends it with iron to make ferrotitanium. The materials are charged to an induction furnace where they react to form ferrotitanium at an average temperature of about 2,650°F (1,454°C). The metal is poured into molds to form 5×5-ft ingots (1.52×1.52 M), about 6 in. thick (15.24 cm) and weighing 1,900-2,000 lb (862-907 kg).

Ferrotitanium is very brittle and starts to shatter as it cools, explains Adam Perry, Global’s assistant operations manager. “We put the metal through two jaw crushers, then send it to the separator for classification to 8, 10 or 12 mesh, depending on what the customer wants.”

The Kason machine is a Vibroscreen classifier, a circular unit that can accommodate up to five horizontal screens. Material is fed to the top screen, which separates the coarsest particles, then progressively finer material is removed by the lower screens. The entire assembly is vibrated by a high-torque, 2.5-HP gyratory motor, located below the housing. The assembly is supported by rugged springs that allow the machine to vibrate freely without transmitting vibration to the plant floor.

Global Titanium’s classifier is made entirely of stainless steel and has two 60-in.-diam (152-cm-diam) screens, which separate oversized material for recycling to the crushers. Oversize particles migrate to the periphery of the machine and are discharged from a porthole into a chute. Finer material falls through the screen onto a deflector plate, which directs it to the middle of the next screen. The desired product is recovered from the bottom of the unit.

The Vibroscreen classifier replaced an old separator that operated in a similar manner, but it was made of mild steel and the ferrotitanium tore holes in the sidewall. “We had to repair the machine about once a month,” says Perry. By comparison, the stainless steel separator has been in place since the spring of 2004, and so far has shown no sign of wear.

Perry notes that the 60-in.-diam. (152-cm-diam.) Kason machine also meets the company’s production needs, which had outgrown the capacity of the old, 48-in.-diam. (122-cm-diam.) unit. The Kason separator processes 1,200-1,500 lb/h (544-680 kg/h) of material, which is filled into 3,000-lb (1,360-kg) bags for shipment to steelmakers across the Midwest. A standard shipment is 45,000 lb (20,412 kg). The base of the machine is on a stand about 2 ft (61 cm) off the floor, to allow room for the bags to fill. The product comes down the chute into the bag, which is set on a scale. The plant typically runs two shifts, and sometimes three shifts.

SCREENS are changed regularly to match customer needs. For smaller particles, below 8 mesh, Global supports the fine screen on a heavier backup screen of larger mesh. “This allows us to add more weight and increase the capacity.
without damaging the fine screen,” says Perry.

Global uses an identical Vibroscreen separator to screen titanium sponge, which the company receives from customers and vendors as mixed scrap that ranges from fines to rock-like chunks. This material is passed across a magnetic drum to remove ferrous metal, then crushed to the customer’s requirement, which may range from 10 to 60 mesh. Fines are mixed with other material in the furnace and made into briquettes.

Emergency On-Site Repair, Condition Monitoring Program
Keep Gallatin Up and Running

Back in March, workers at Gallatin Steel’s six-stand hot-strip mill heard an unusual noise coming from a shaft on a mill stand that’s critical to the production process. Gallatin Steel is a mini-mill in Ghent, KY, producing 2.5 million tons/year of hot-rolled strip.

With assistance from an on-site representative of The Timken Co.’s (www.timken.com) predictive-maintenance program, the noise was identified as a broken bearing cage, resulting from high speed and impact force upon a two-row tapered bearing.

The bearing, supplied by a Timken competitor, had been in service since the mill started up in 1995. In order to get the mill stand back into production as quickly as possible, it was removed and inspected, the cage was welded in the six places where it had fractured, and the gearbox was re-assembled. Timken also corrected the bearing clearance and made several other modifications to minimize wear patterns that might occur after the assembly was re-mounted in the mill stand. Since the re-installation, the bearing (with its cage repaired cage) has been operating on the input pinion shaft with no problems.

So that Gallatin might avoid future emergency repairs, Timken installed a StatusCheck™ condition-monitoring device on the bearing to measure overall vibration. StatusCheck is a wireless system that detects and monitors excessive levels of vibration and temperature. For Gallatin, it will alert the pulpit operator to vibration changes in the bearing, indicating potential bearing problems in the mill stand. This information can then be evaluated by Gallatin along with Timken’s on-site technical team, and more diagnostic testing may be required to understand the severity of the situation.

Timken offers a number of condition-monitoring products and services, including portable instruments, continuous-monitoring devices and online systems.

“Timken is an integral part of our overall preventive and predictive maintenance programs and has played a very valuable role in helping us identify potential problems before they actually became problems,” states Gallatin Steel president Don Daily.

“Our work with Gallatin Steel is representative of the friction management expertise Timken provides to steel producers around the world," said Michael J. Connors, v.p. of Timken’s Industrial Equipment business. “In this emergency application, our team’s ability to combine on-site technical support with innovative condition monitoring products and services underscores our fundamental commitment to helping improve our customers’ performance, no matter the circumstances.”