Tableware foundry sifts out defects

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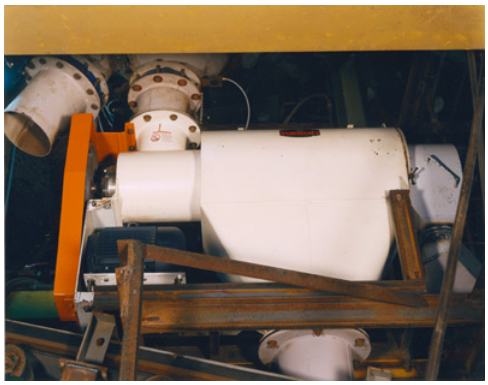
A foundry installs a centrifugal sifter that removes contaminant materials from casting sand to reduce casting defects.

Wilton Armetale, a foundry in Mount Joy, Pa., manufactures tableware using Armetale, a proprietary nonferrous metal blended from 10 alloys. Armetale resists chips, breaks, cracks, or dents and has insulating properties, making it useful for Wilton's tableware line, including plates, mugs, goblets, pitchers, platters, sconces, and other accessories. Wilton also has an Engineered Products Division that casts, finishes, and polishes short runs of products for such industries as baking, furniture, plumbing, lighting, and power tools.

For tableware casting operations, the foundry receives 100-pound bags of 120 mesh olivine sand. A muller conditions 2,000-pound batches of casting sand by mixing clay and water with the olivine sand.



The centrifugal sifter at the Wilton Armetale foundry removes contaminant materials from casting sand prior to reconditioning and reuses.

After conditioning, a bucket elevator lifts the sand to a belt conveyor that distributes the sand to ten molding lines, where workers use coarse screens called riddles to remove any contaminant materials from the sand. The workers manually form the molds; for tableware pieces that have a cavity, such as goblets or pitchers, workers insert a core into each mold. Next, Armetale is poured into the molds and allowed to solidify. Then the molds and castings are placed into a large vibrating pan that separates most of the used sand from the castings, sending the used sand down a trough while the castings are removed for washing.

After washing the castings, foundry workers grind off parting lines and remove visible imperfections (especially those in recessed areas) with an air-operated, handheld sanding tool. Next, the workers remove the grainy surface on the castings using vibrating media and emery wheels with aluminum oxide. Finally, the castings are buffed, polished, and rewashed. Throughout casting operations, quality control inspectors identify any tableware piece with defects so it can be recast

Meanwhile, a return belt conveyor moves the used sand from the casting operation to a return bucket elevator that dumps the used sand into a 60-ton storage tank

Screening method leaves contaminant materials in used sand

Wilton screens and reconditions its used sand for reuse. The used sand contains contaminant materials such as scrap metal and core butts - fragments of the cores from tableware pieces with a cavity. Without screening, contaminant materials in the sand can result in tableware with surface and subsurface defects, which reduce the finished tableware's value. Shallow subsurface defects may not be visible until after the finishing step, which requires labor time, while deeper subsurface defects may be undetectable altogether by quality control inspectors.

In the past, Wilton reconditioned used sand with an assembly consisting of a rectangular screen deck with an additional l8-mesh rectangular screen mounted on top. During the night shift, while the foundry wasn't casting, the sand from the 60-ton storage tank was circulated through the screen deck assembly. Because some sand would hang up in the storage tank, only about 70 percent of the foundry's sand was screened using this method. The remaining 30 percent of sand still contained some contaminant materials.

In addition, the screen deck assembly didn't apply the forces needed to break up agglomerated clay, which held sand together. The agglomerated clay and sand was discarded with scrap from the screen deck, wasting 1.5 tons of sand per day.

Foundry seeks new screening method

Because Wilton wanted to screen 100 percent of its sand and stop discarding sand, the foundry sought an alternative screening method. The foundry wanted a method fast enough to operate on-line, which would require a screening capacity of 25 tons of used sand per hour. After testing a supplier's vibrating screener and centrifugal sifter, the foundry decided the Supplier's centrifugal sifter was better suited to screening used sand at the required rate.

Centrifugal sifter breaks up agglomerates with helical paddle

Wilton selected the supplier's centrifugal sifter, called the Centri-Sifter™, to screen used sand. The sifter has a feed inlet, a feed screw, a cylindrical sifting chamber consisting of a helical paddle within a cylindrical perforated steel plate, and outlets for sifted material and contaminant materials. In operation, material enters the inlet and the feed screw pushes material into the cylindrical sifting chamber. The helical paddle rotates without contacting the perforated plate to break up soft agglomerates and propel the material against the plate. Contaminant materials -scrap metal and core butts - exit the sifter.

A 7.5-horsepower motor turns the sifter's rotating components. The sifter has a specially designed drive belt for better grip during sand sifting. Double-seal outboard bearings in the sifter extend its service life. A spring-return, 8-inch-diameter butterfly valve controls the sand feed into the sifter.

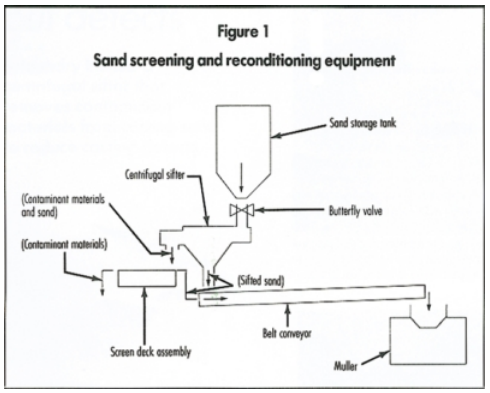


Figure 1
Sand screening and reconditioning equipment

Sifter meets capacity , operating requirements

Wilton installed the centrifugal sifter below the 60-ton sand storage tank to screen all discharged sand before use.

The sifted sand falls onto the belt conveyor that feeds the muller. Contaminant materials and any remaining sand from the centrifugal sifter are directed to the rectangular screen deck assembly. Sifted sand from the rectangular screen deck assembly combines with sifted sand from the centrifugal sifter, while contaminant materials are discarded. The sifter screens 25 tons of sand per hour and runs 7 hours per day, 5 days per week, in 125-second intervals synchronized with the muller.

Since installing the sifter, a much higher percentage of Wilton’s castings have desirable surface and subsurface characteristics, allowing them to be sold as premium products, rather than being recast.

The new sifter also breaks up the agglomerated clay that holds sand together. As a result, the foundry now loses less than 25 pounds of sand per day, compared with 1.5 tons per day previously, according to Don Tome, project supervisor. Thus, Wilton spends much less to replace the lost sand. In addition, the sifter also preconditions the sand, resulting in better mixing in the muller and more uniform molds.

(Information take from article CH-138)