

Stack Sizer[®] machines improve iron ore classification by replacing hydrocyclones

- Reduced silica content to less than 3%
- Increased feed rate
- Circulating load reduced by 50%

Background

In May 2003, one of the largest producers of iron ore pellets located in South India contacted Derrick[®] Corporation for assistance in upgrading iron ore concentrate and recovery potential. The mined ore contained 8 to 9 percent silica, while customer specifications required less than 3 percent silica content. The producer had installed a column flotation circuit to reduce the silica in ground ore containing 80 percent -325 mesh material, but the circuit could not reduce silica to less than 4 percent in the final concentrate. Consequently, the customer was having difficulty marketing the concentrate because it contained an unacceptable percentage of silica. To find a means of reducing the silica content, the producer sought the assistance of Derrick Corporation.

Solution

Three rounds of sample testing were conducted at the Derrick test lab in Buffalo, New York. The lab results demonstrated significant reduction in silica, from 8 to 9 percent down to less than 3 percent using 63 micron aperture stainless steel wire mesh Sandwich Screen[®] panels. The oversize from the screens was then treated in the column flotation circuit, which worked well since slimes had been removed in the screening process.



Closed circuit grinding with 180/210 µm urethane screens

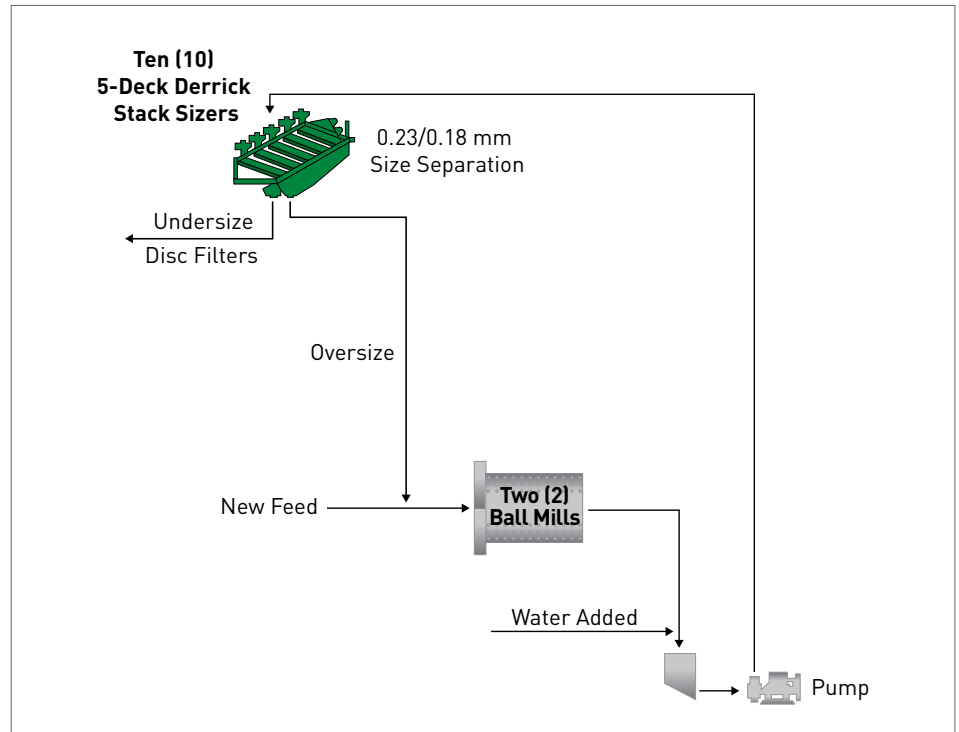
In 2004, the customer purchased four five-deck Stack Sizers, which they installed in two of their four lines process lines. In 2005, they ordered two additional five-deck Stack Sizers to handle the increased feed rate. Stack Sizer[®] technology proved beneficial both for upgrading concentrate as well as for de-sliming the column feed. Due to environmental issues, the beneficiation plant was shut down in 2006. All six Stack Sizers were then transferred to a pellet plant, where hydrocyclones were operating in a closed grinding circuit.

After consulting with Derrick engineers regarding poor classification, the client replaced the hydrocyclones with Stack Sizers.

This led to a large reduction in circulating load—about 50 percent—and higher classification efficiency of about 90 percent. In 2010, the company added four additional five-deck Stack Sizers to replace hydrocyclones in both ball mill circuits. The flowsheet shows ten Stack Sizers closing the grinding circuit with two ball mills.

Conclusion

This customer was the first hematite iron ore producer to install Stack Sizer technology in India. The success of fine screens in their grinding circuit has caught the attention of the Indian iron ore industry. Consequently, a large number of iron ore producers are now considering the Stack Sizer to improve the classification by replacing hydrocyclones.



Grinding circuit using Stack Sizer classification

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