

# Stack Sizer® improves classification efficiency, lower energy cost in second-stage grinding circuit

- Production rate increased by 15% to 20%
- Recirculating load fell by 38%
- Power consumption dropped 50%

## Background

The iron ore mine operated by OJSC KMaruda in Russia produces ore containing 34 percent total iron. Processing is performed by four identical-size mills. The primary grinding circuit on each line consists of two ball mills in parallel, operating in closed circuit with spiral classifiers. The second-stage circuit has two ball mills in parallel, operating in closed circuit with hydrocyclones (see Figure 1: Original second-stage grinding circuit). Magnetic concentrate from the primary grinding circuit is fed to the hydrocyclones in the second stage circuit. Underflow from the cyclones is discharged to the second-stage mills, which feed second-stage magnetic separators. The second-stage magnetic concentrate circulates back to the cyclones, and overflow from the cyclones is fed to the third stage of magnetic separation.

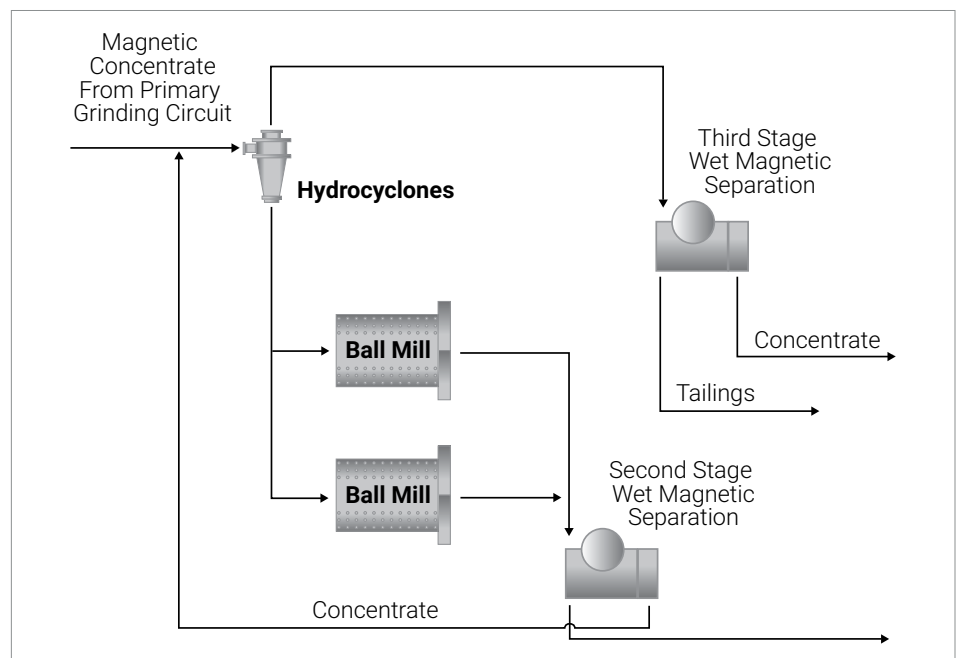


Figure 1: Original grinding circuit closed with hydrocyclones

## Solution

KMaruda’s goal was to improve classification efficiency. To upgrade the second-stage concentrator circuit two Derrick® Stack Sizer® screens fitted with 100 micron Polyweb® urethane panels were installed in place of the hydrocyclones (see Figure 2: New second-stage grinding circuit). Table 1 contrasts the performance of hydrocyclones and Stack Sizers in the concentrator circuit.

PARAMETER	HYDROCYCLONES	STACK SIZERS
Capacity (t/h)	120	140-150
Secondary Mill Power Consumption	1260	630
Secondary Mill Circulating Load	210-220	130-160
Secondary Mill Circulating Load Particle Size (% -71µm)	51.0	22.9
Final Concentrate Size (% -71µm)	92.5	82.0
Final Concentrate Grade (% Fe)	65.85	66.0
Final Concentrate Iron Recovery (%)	82.2	84.6
Final Tailings Grade (% Fe)	10.9	9.09

Table 1: KMaruda concentrator performance with hydrocyclones and Stack Sizers

## Conclusion

The comparison table shows the major benefits Stack Sizers provided to KMaruda's second-stage mill operation. Testing and optimizing the Stack Sizer installation produced a large improvement in classification efficiency, resulting in greater line capacity. Power consumption per ton fell by 50 percent, while capacity rose by 15 to 20 percent. These combined factors permitted elimination of one mill. The circulating load fell by 38 percent, and the percentage of minus 71 micron particles in the final concentrate fell by 9.5 percent. In addition, the percentage of iron in the final tailings dropped from nearly 11 percent to just over 9 percent.

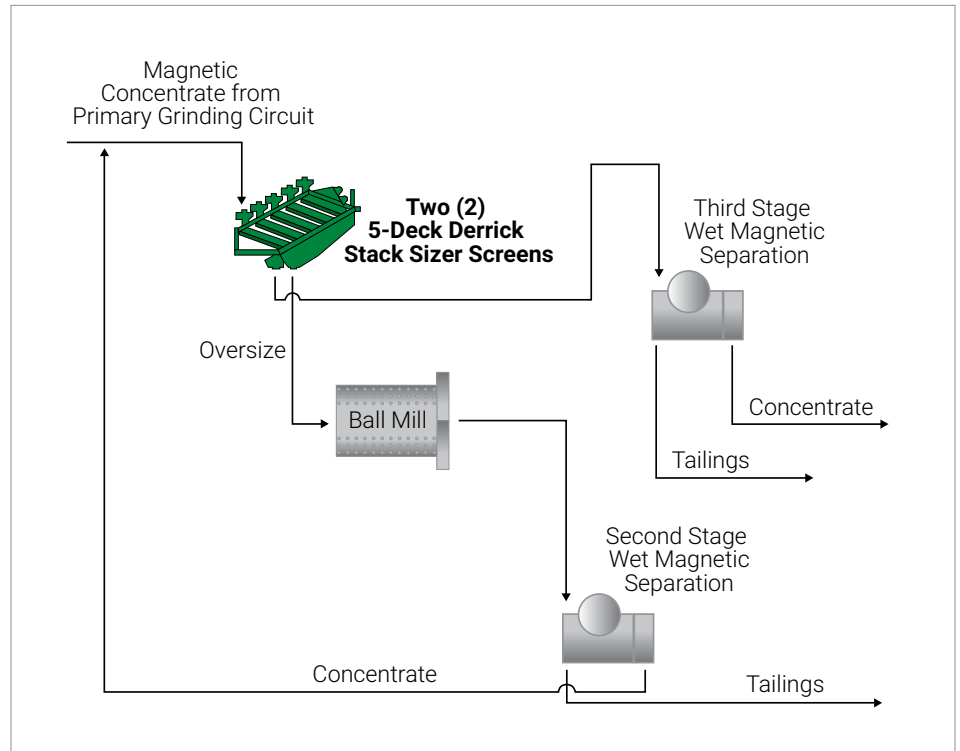


Figure 2: New grinding circuit closed with Stack Sizers

**For more information, please contact your local Derrick sales representative.**

590 Duke Road • Buffalo, New York 14225 U.S.A. • Office: (716) 683-9010 • Fax: (716) 683-4991  
info@derrick.com • www.Derrick.com