

Stack Sizer® improves Jianshan operation at TISCO

- Capacity improves by 50%, from 6 million tons/year to 9 million tons/year
- Circulation load decreases from 200-300% to 60%
- Improves tertiary grinding efficiency from 0.22 t/(m³.h) to 0.45 t/(m³.h)

Background

Jianshan Iron Ore Mine processes 6 million tons of iron ore yearly and supplies product to its mother company Taiyuan Iron and Steel (Group) Co. Ltd. (TISCO) via two parallel 102km pipelines. With the aim to increase production by 25 percent, Jianshan Iron Ore Mine was considering two options: purchase a new mill or improve their current operation, especially the grinding circuits.

With the ore becoming finer and harder, the grinding circuit, especially tertiary grinding, had become less efficient due to poor classification operation. They were using domestic fine screens with either nylon surfaces or wire panels (Figure 1). The undersize efficiency was 28.09 percent for nylon surfaces and about 60 percent for the wire panels. However, due to the blinding of those panels, the efficiency continued to degrade and, therefore, the liberated fine particles could not pass through the panels. As a result, their circulation load was normally in the range of 200 to 300 percent, and they also were experiencing overgrinding and low capacity in the closed grinding circuit.

Buying a new mill to produce the targeted additional 1.5 million tons/year appeared inevitable.

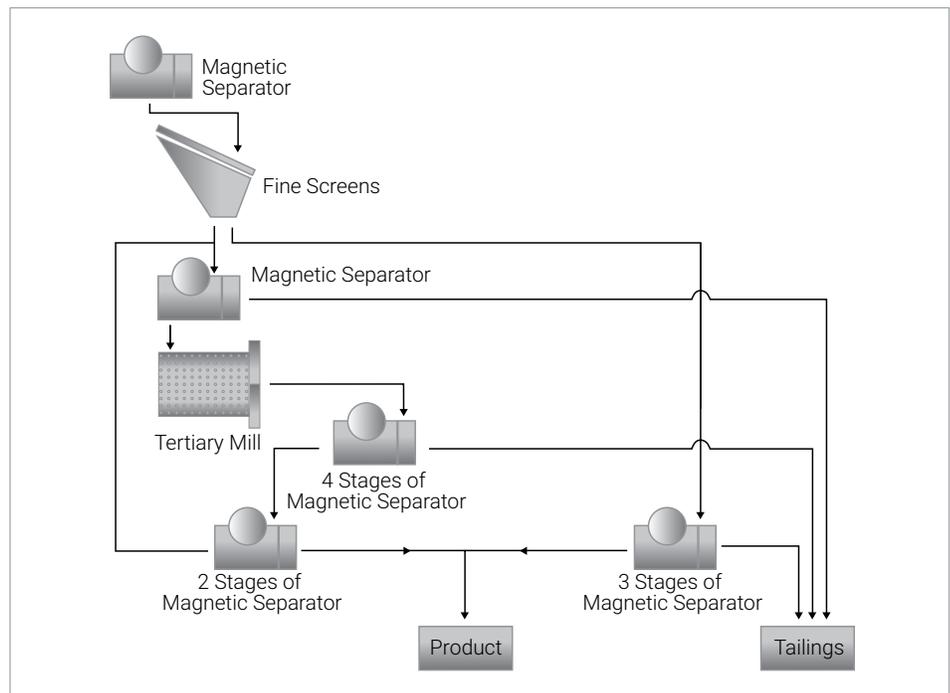


Figure 1. Original Jianshan Iron Ore Mine flowsheet

Solution

The process engineers in the Jianshan Iron Ore Mine were thinking of achieving their objective by improving the classification efficiency of their closed grinding circuit. To explore this possibility, they decided to evaluate the performance of the Derrick® Stack Sizer®. In June 2004, Jianshan sent a sample to the Derrick testing lab at Buffalo, New York.

The testing was very successful, indicated by high undersize efficiency

of 78.42 percent, fine undersize product 93.79 percent passing 200 mesh, and high grade undersize product of 65.43 percent at 40 percent feed solid content. Following the successful lab testing, Jianshan purchased eight Stack Sizers to close their tertiary mill (Figure 2). In addition, they upgraded their magnetic separation systems.

Conclusion

After installation of the Stack Sizers, the process engineers conducted onsite evaluation, and the results showed that the Stack Sizer can achieve high classification efficiency (above 70 percent) consistently with panel life exceeding domestic panels. The undersize recovery was improved from 20 percent to 60 percent as a result of reducing the circulating load from 200-300 percent to 60 percent. The content of -325 mesh decreased from 82 percent to 75 percent for the same final product grade. In other words, the overgrinding problem was eliminated by the improvement in classification performance. For the oversize product, the content of -200 mesh decreased from 82 percent to 55-60 percent, resulting in true oversize regrinding. Additionally, the oversize solid content increased from 60-63 percent to 67-70 percent due to a reduction in fines.

The performance of the tertiary mill is, therefore, significantly improved, as indicated by an effective tonnage improvement from 0.22 t/(m³.h) to 0.45 t/(m³.h). As a result, one of the four mills in the tertiary grinding circuit was removed from service. The spare mill was then used for a capacity expansion application.

Today, the Jianshan Iron Ore Mine has 16 Stack Sizers—4 in secondary grinding and 12 in tertiary grinding—and the total capacity of the plant is now 9 million ton/year.

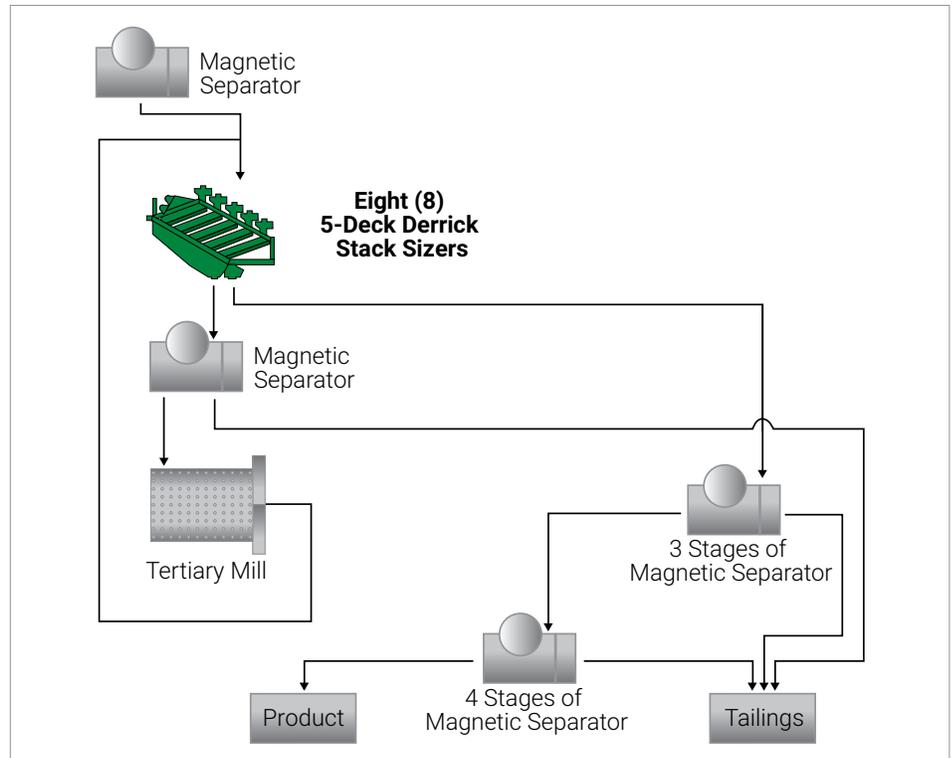


Figure 2. New Jianshan Iron Ore Mine flowsheet incorporating Derrick equipment

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

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