

Stirred Mills & Fine Screens

Application of efficient grinding and classification technology for a profitable operation

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Current Scenarios

Reduce cost and increase productivity in a sustainable manner

Necessity to seek for technical solution for **reducing energy, water, greenhouse emission, improve safety** while **enhancing business and financial performances**

What's being done to make plants more efficient than previous generation plants?

- Implementation of technology
 - Stirred Mills and Fine screen
- Stirred Mills
 - Secondary, tertiary, regrind and ultrafine grinding duty
- Fine screen
 - Replacing hydrocyclone for more efficient classification
 - *Russian magnetite plants are seriously looking at this option*

Stirred Mills & Fine Screens

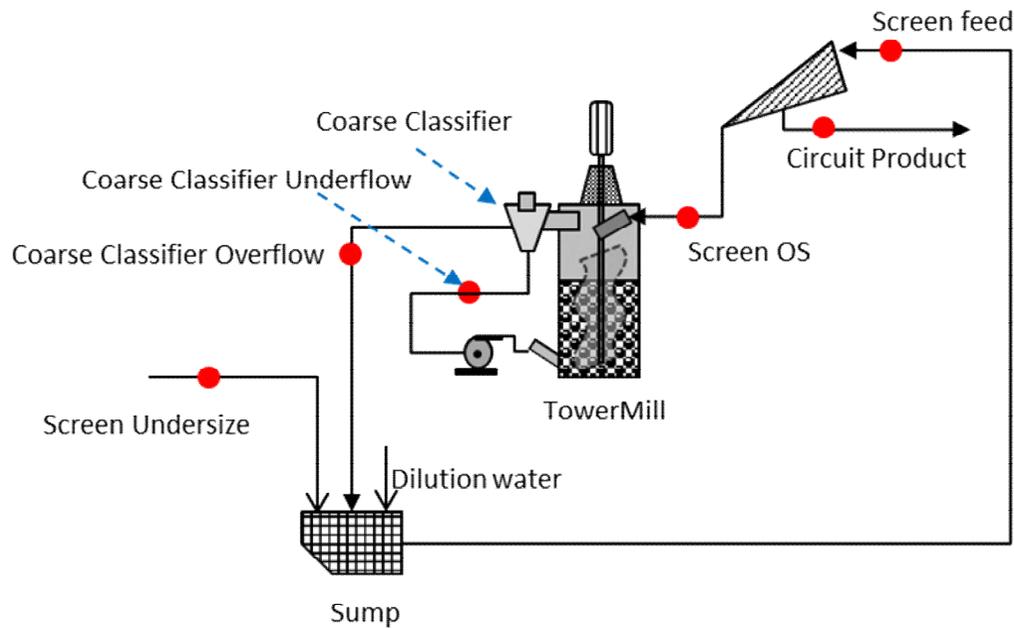
Stirred Mill is an established technology

How to utilize this technology effectively within the comminution circuit to maximize grinding efficiency?

Fine screen is more efficient and exhibits lower circulating load compared to hydrocyclone

Coupling Stirred Mill and Fine Screen will boost the overall grinding efficiency..

Stirred Mill Circuit Offers Operational flexibility

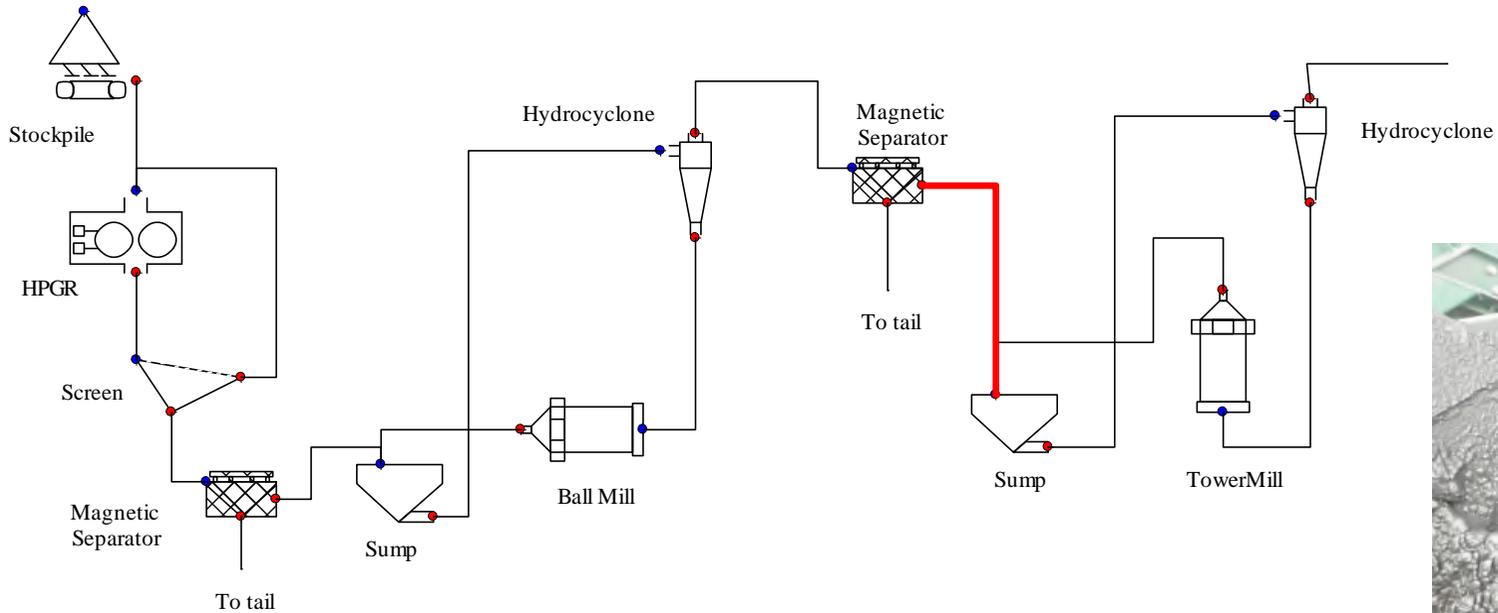


- Coarse Classifier
- Hydrocyclone vs. fine screens
- Mill feed configuration - Top vs. bottom
- Online PSA coupled with Variable frequency drive
- Ability to turn down

Other Potential Applications

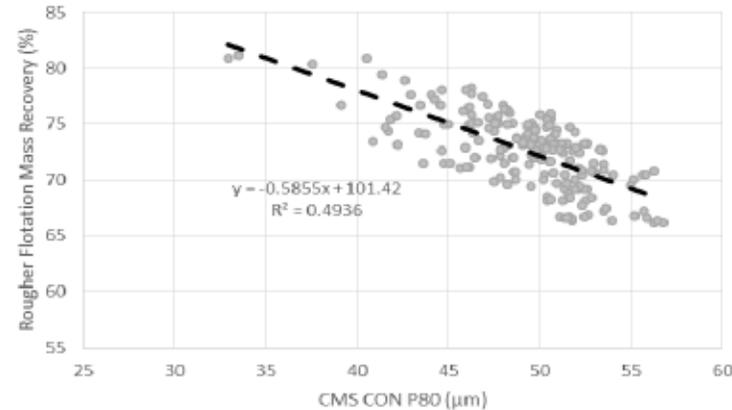
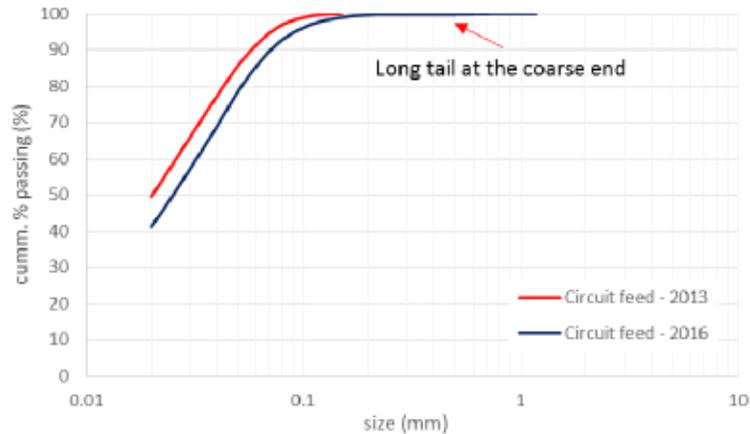
- To enhance the operability in **Single Stage SAG Circuit**
- **SABC circuit expansion** – Tertiary grind circuit
- **Regrinding** of multi feed stream - bimodal feed size distribution and hardness

Shifting the comminution workload



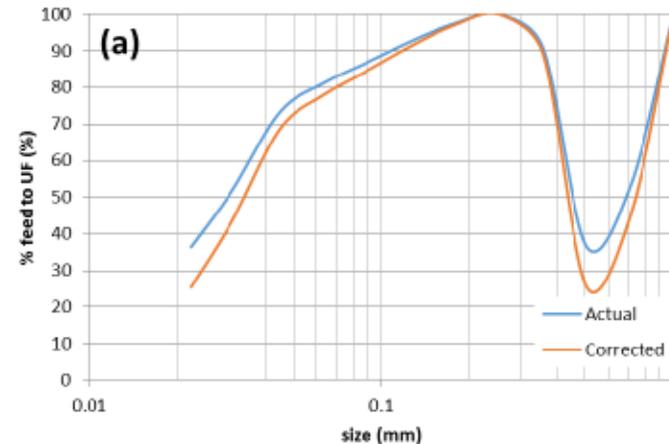
Consequences

- Circuit feed and product of the fine grinding circuit → Coarser
- Affected the magnetite recovery and increase in the reagent consumption



Smart and Strategic Partnership

- May 2016 – Conducted circuit survey around the TowerMill circuit
- Identified the issues
 - Coarse feed size compared to design
 - Multicomponent effect
- Provide recommendations for improvement
 - Convert the mill feed configuration
 - Smaller grinding media
 - Utilize the fine screen with a coarser mesh
- Support
 - Support the site with circuit simulations to quantify the amount of improvement that can be achieve



Smart and Strategic Partnership

- Internal champions
 - Metallurgy and mechanical/maintenance department
- November 2016 - Budget for modification approved by Karara Management
- December 2016 – One TowerMill was converted to bottom feed configuration
- Implementation of recommendations
 - January 2017 – Conducted comparison survey between top and bottom feed and demonstrated the success of the implementation
 - March 2017 – All TowerMill were converted to bottom feed configuration
 - January 2018 – Implementation of 17 mm grinding media

2018 CEEC Medal



Impact on Energy Efficiency and footprint

30 – 35 % more efficient
compared to the conventional
technology

Improve concentrate and water
recovery

Decrease reagent consumptions



Buy-in to invest in the technology

- **Educate the stake holders** and build confidence
 - Collect more operational data and site visits from current installation
 - Understand the issues and seek for solution
 - Laboratory and Piloting trials for new applications
- **Low Total Cost of Ownership**
- **Smart and Strategic Partnership** – End users, Engineering Companies, METS, research organisation and consultants
- **Demonstrate Unique solution** to achieve the project's objectives