vedanta transforming for good | HINDUSTAN ZINC Zinc & Silver of India

Title of the Project - Implementation of India's first Dry tailing plant (DTP) for tailing management.

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SAFE SMART SUSTAINABLE

OVERVIEW OF THE PROJECT

- Zawar Mines is having 4 underground mines producing **lead- zinc ore**. Ore produced from mines is beneficiated in beneficiation plant producing **zinc concentrate and lead concentrate**.
- **Tailing** is a waste material generation from the beneficiation plant. From the beneficiation plant, the tailings are pumped to slurry into scientifically designed containment areas, a Tailings Storage Facility (TSF).
- Conventionally, **wet method of tailing disposal** was in practice which was having ~40 to 50% solids.
- Switched to **dry method of tailing disposal** having ~80 to 85% solids by setting up India's first Dry Tailing Plant at Zawar Mines in Rajasthan at an investment of Rs. 96 crore.
- **Technology provider**: M/s FL Smidth

Types of Tailing Disposal

Wet Tailing Disposal

- Mill tailings which contain 40-50% solids is directly disposed in the tailing dam
- Dewatering pumping system arranged over the tailing dam to recover the accumulated water and reused in the milling operations.
- Only 50% of water is recovered from the tailing dam (by pumping and seepage collection system)

Dry Stacking Method

- The dry cake was stacked over the tailing dam with required 95% compaction of maximum dry density.
- For every 10 mtr height raise maintained 1:3 slope and rock waste being filled over the tailing in the slope with proper drainage system and it connected with the periphery drain.
- Dry stacking method eliminates the water content over the tailing dam and increase the dam safety

DRY TAILING PLANT- PROCESS FLOW

- Mill Tailings @ 50% solids
- Thickening @ 65% solids
- Filtration upto 84% solids
- Dry Dispose at TSF
- Compaction of Dry Stack area

Beneficiation Plant

Thickener

Disc Filter

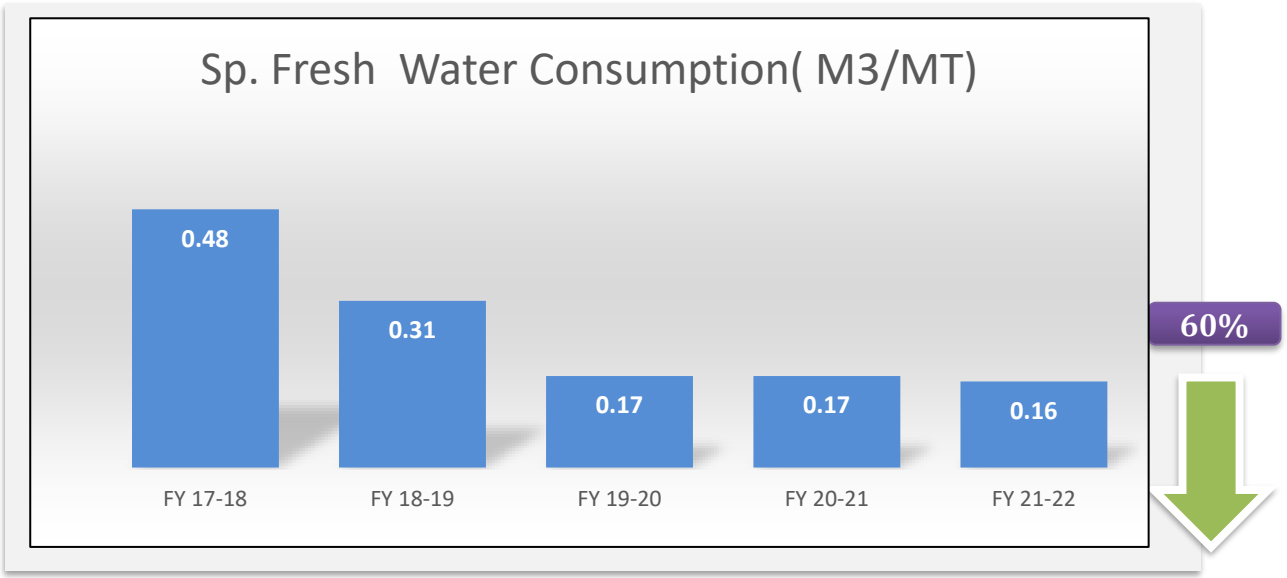
Dry Cake Disposal

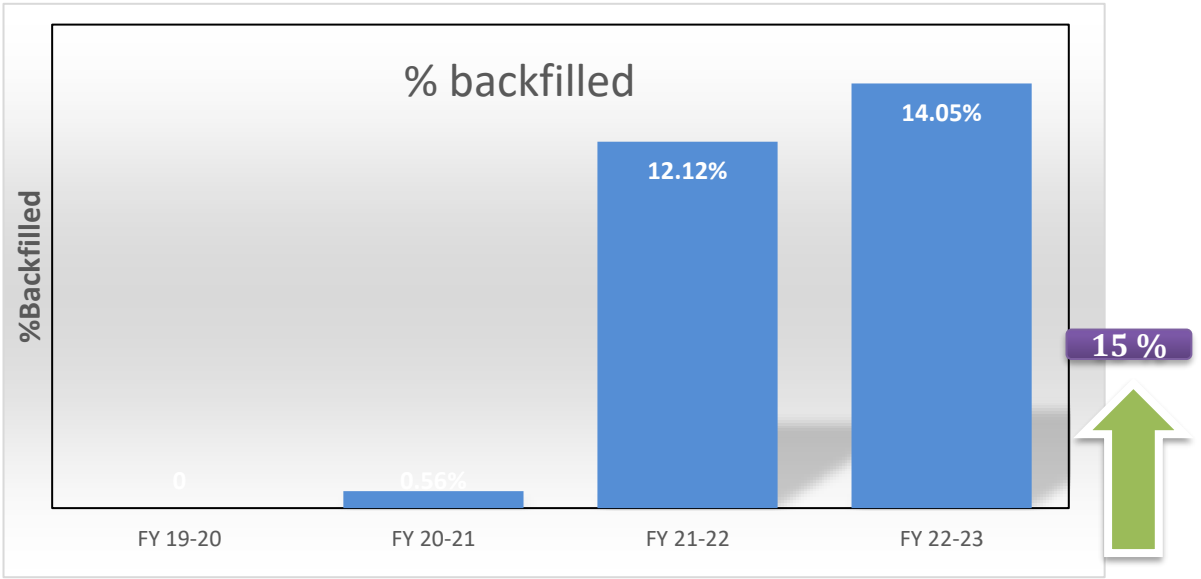
DRY STACKING

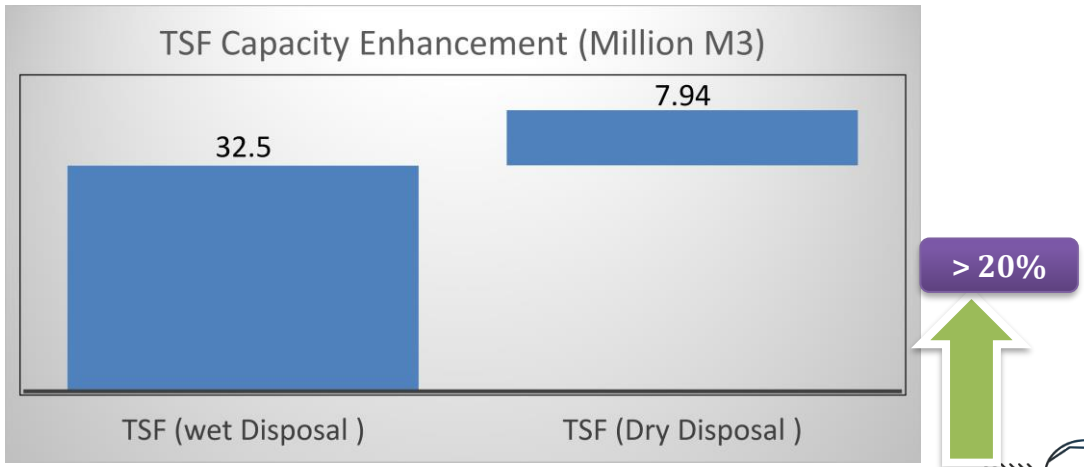
UNIQUENESS OF THE PROJECT

- Dry stacking of tailing at tailing storage facility (TSF) in place of conventional wet tailing disposal
- It reduces the waste disposal area requirement as the dry cake stacking can be done resulting in storage of higher volume per unit of land.
- Alternative usage of this dry tailing material in backfilling the voids created during mine operation by using paste fill and hydrofill methodology.
- It is eco-friendly method as it eliminates wet slurry disposal improving the overall safety of the structure
- It reduces the specific freshwater consumption in mill operations as recovery has improved.

Tangible Benefits







Intangible Benefits

1. Smaller tailing footprint: less space requirement for stacking tailings compare with wet disposal method
2. Improved dam stability: significant safety improvement with the risk of catastrophic dam failure being eliminated.
3. Social benefits: Employment generation (200 manpower) for dry tailing plant and tailing stacking
4. Elimination of water seepage and water losses due to evaporation: due to dry stacking of tailing
5. Backfill: dry tails suitable for use in backfilling (pastefill) operations.

Replication Potential of the project

This is being replicated at our other mining units (Rajpura Dariba Complex: ongoing).

This has potential to be replicated for eco-friendly management of tailings generated in other sectors etc

Reason behind initiating the project

- Earlier the wet tailing disposal at TSF was done through pumping system having almost 45-50% of solids, reclaimed water which was accumulated over TSF was again pumped back to mill operations (it recovers 50% of water). It used to consume more area in TSF for storage of tailing and water recovery was less.

- Dry tailing plant produces dry tailing material (contains 80-85% of solids) by using thickener & filtration operations and is stacked at TSF based on design, which increases the dam stability and eliminates water at TSF. It also increases the TSF storage life.

Challenges faced and brief on countering

Problem Statement	Root Cause	Solution
Lack of space for wet tailing disposal at both TSF's	• Tailing Dam construction height getting restricted upto 434 mRL.	• Conversion of wet disposal to Dry stacking methodology which increase the life in existing TSF.
Space constrain for Dry Tailing Plant installation	• At tailing dam nearly 50mtr height raised through wet disposal method.	• Ground stability done at Dry Tailing Plant installation area through Stone pilling method.
Low Filter Feed density	• Recycle water and slurry lines connected to filter feed tank it decreases the filter feed density	• Recycle water and filter drain lines connected to thickener feed box and maintain the required feed density.
Excessive wear out in the vacuum pump spares	• Increase the slurry contamination in the pumps	• Vacuum pump return water pumped back to thickener and use clear water for vacuum seal water to reduce the wear out of vacuum pump spares
Dust generation over dry stacking	• Dry tailing material stacked over the tailing dam	• Nearly 500mm layer of rock waste filled over the stacked area with proper drainage system to avoid the dust generation.
Dry tailing material handling issue.	• High moisture content in the final cake.	• Increase the operational efficiency of filters through various initiatives.

National benchmark & Standards

- The project aligns with HZL's vision of continuous implementation of latest technology in industry which improves process efficiency and Environmental management practices.
- Hindustan zinc is first mining company in India to implement Dry Tailing plant and dry stacking method at Zawar mines TSF with a capacity of 5 MTPA.

Priority plans on fast track for +1 year and +2 years

+1 year Plans

- Specific water reduction of Beneficiation plant from 0.16 to 0.10 cum/MT of ore treatment by implementation of 4 MLD water treatment plant

+2 years Plans

- 30 % tailings utilization in backfill with introduction of additional paste fill plant.

Major Learnings from the Project Implementation

01 Implementations of modern technologies which can run the business more efficiently without causing any harm to the environment .

02 Reducing Environmental Footprint (increased gainful utilization of waste, increased water recycling) through change in technology

03 Efficiency and Reliability of Paste Fill over other backfilling process like sand fill and hydraulic fill.

THANK YOU

HINDUSTAN ZINC
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