

# Metal separation matters

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# Is **metal** or **metal contaminated material** your challenge?



Metal in VRM reject?

No fine separation of metal?



# Potential and **hidden consequences** of excess metal in raw material

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- **Reduced mill output** (due to vibrations).
- Premature VRM **roller wear** and damages.
- Risk of vertical roller mill (VRM) **gearbox failures**.
- Loss of raw material (**contaminated reject material**).
- Extra handling and **logistics costs** for vehicles, manpower, fuel, vehicle maintenance and storage of additional material.
- ...
  
- Loss of unseparated metal premium in contaminated rejects.
- Blockages in gates (e.g. clinker silo extraction) and dosing valves.
- Damages on belt conveyors and transfer chute blockages.

# Quick economics of a poor metal separation

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- Premature failure of VRM gearbox:

$$\text{Costs} = \frac{\text{New Gearbox [USD]}}{\text{Reduced lifetime [year]}} - \frac{\text{New Gearbox [USD]}}{\text{Normal lifetime [year]}}$$

## Example:

New Gearbox: 500'000 USD

Normal lifetime: 6 years

Reduced lifetime: 2.4 years

**Annual cost occurred: 125'000 USD**

- Reduced mill output (due to vibrations):

$$\text{Costs} = \text{Grinding capacity [TPH]} \times \text{reduced fresh feed [\%]} \\ \times 24 \text{ [h]} \times \text{OEE} \times \text{EBITA margin [USD]} \times 365 \text{ [days]}$$

## Example:

Grinding capacity: 250TPH

Reduced fresh feed due to vibrations: 1%

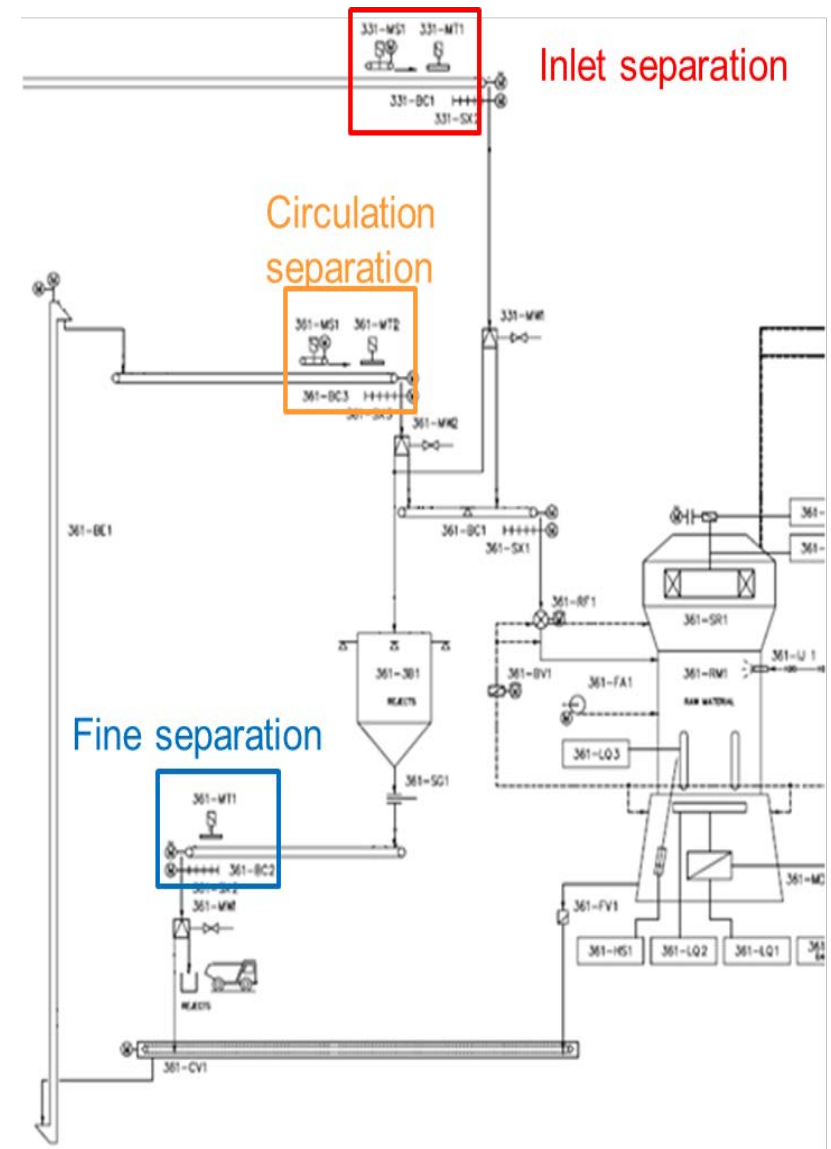
Overall equipment efficiency (OEE): 80%

EBITA margin (2017): 12 USD/t cem.

**Annual cost occurred: 210'240 USD**

# Basics: Plant metal separation

- Metal (ferrous and non-ferrous) needs to be removed from raw material at strategic locations.
- Efficient metal separation can be achieved if material bed height is lowest on conveyors.
- A VRM requires an inlet and a recirculation protection system.
- An additional fine separation will reduce material rejects and handling costs of contaminated material.



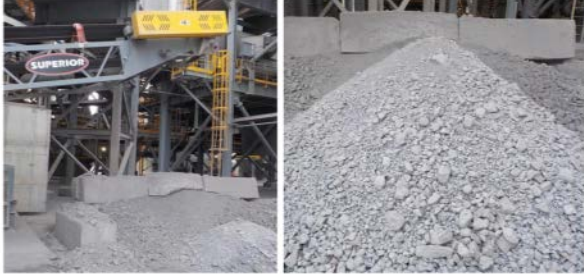
**What do we offer?**

# Our competencies to separate efficiently metal

- Review of overall metal separation concept in plants and projects.

**Observations**


- Gate is ~ 9 seconds open but only few metal is collected **after raw-mill metal reject bin** (fine metal separation).



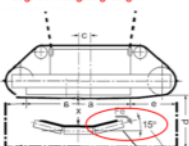
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- **Technical due diligence on site** with simple & hands-on visual reports with action list generation for follow-up and ease of tracking.

**Recommendations: Increased efficiency**




As installed today with 35 degree troughing angle



As recommended with 15 - 20 degree troughing angle

- Reduce belt troughing angle below magnet to 15° and include a transition distance (after magnet to be lowered).
- By reducing the troughing angle the material bed height will be automatically reduced.



Magnet separator  
Belt

- Idler troughing angle: 15°
- Idler troughing angle: 20° (transition distance)
- Idler troughing angle as today installed

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