TECHNICAL IMPROVEMENTS IMPLEMENTED IN MIDREX® DIRECT REDUCTION PLANTS

SLURRY TREATMENT BY CHAMBER FILTER PRESSES

TECHNICAL SOLUTION

The slurry from the clarifier underflow is dewatered at most Midrex plants typically in two large settling ponds.

This slurry in the process clarifiers originates mainly from solids from gas cleaning in the DR plant. The suspended solids are settled by gravity. The slurry treatment system is required for dewatering of slurry from the clarifiers.

To make the dewatering of slurry from the clarifiers more efficient and to lower the operating and maintenance costs, slurry dewatering can be done with chamber filter presses to produce a filter cake with a moisture content of 15–20% (see Fig. 1). This allows a better handling of the filter cake, reduces issues with freezing in cold climates and provides a possible input material for oxide briquetting. The slurry from the clarifier underflow is maintained at a constant concentration factor of approx. 400 g/l, but a higher factor is also possible. Continuous operation at a constant level has a positive effect on the water quality of the clarifier overflow and the process water supply to the plant.

The slurry (underflow) from clarifier(s) is pumped by the clarifier underflow pumps to a slurry tank equipped with an agitator. The slurry tank provides surge capacity for the filter press feed pumps.

The slurry from the slurry tank is pumped by the filter press feed pumps to the chamber filter presses where the water content is reduced.

The slurry flows through a filter where the solids are retained and the water (filtrate) passes. The dewatered slurry cake drops by gravity for subsequent disposal. The filtrate water is returned to the clarifier(s).

The slurry treatment station can be provided with an additional conveyor or container for the filter cake transport to any downstream facility for further use.

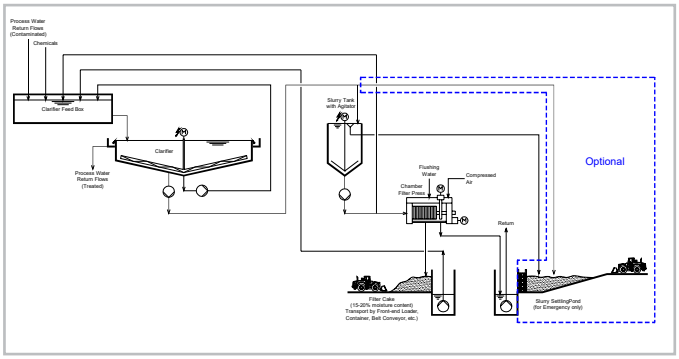

Fig. 1: Simplified flowsheet of slurry treatment with dewatering unit

Fig. 2: Slurry treatment with the dewatering unit

Fig. 3: Filter cake produced by a chamber filter press

MAIN DATA

Type of suspension	Iron ore (or partly reduced ore) dust slurry
Slurry density	1.3–1.5 kg/dm³
Dry solids in suspension	approx. 400 g/l
No. of filter presses	e.g.: 1 operating and 1 standby or 2 operating without standby
Dry solids in filter cake	approx. 80–85% w/w

REFERENCES

- 2.0 MTPY Midrex plant, voestalpine Texas, USA
- COREX® plant C-3000, Baosteel, China
- Most steel plants supplied by Primetals Technologies include a water-treatment plant

MAIN BENEFITS

- Improved handling of filter cake
- Less time for drying process
- Reduction of operational costs (personnel, trucks, etc.)
- Less space requirements for plant layout
- Higher recovery of water → for reduced make-up water consumption
- Reduced loss of expensive water chemicals
- Better quality of circuit process water quality
- Reduced cleaning requirements of contaminated water in the system facilities, which contributes to best possible degasser results
- Cleaner plant roads

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