Imaging technologies to understand grinding at particle scale in a UG-2 platinum ore processing plant

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Reference Number: 71



Motivation, means and objectives

Magotteaux Research program for ball milling optimisation

- Slurry position → Sensomag
- Particle analysis \rightarrow Occhio FC

Case study :

UG-2 Platinum Ore (RSA)

UG-2 mineralization

- ~ 85% chromite
- ~15 % silicates
- <0.1% BMS



Sampling campaign :

14 surveys A cut each $10' \rightarrow$ one hour composites

Particle Image analysis

- High resolution camera
- Several tousands of particles measured in a few minutes
- High reproducibility of measurement



Occhio FC200



Image Occhio FC

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Occhio FC200





Image Occhio FC

Chromite distibution analysis

In-out analysis for each survey i Accumulation_i = $\frac{[\%Cr_{(DU,i)} - \%Cr_{(MD,i)}]}{\%Cr_{(DU,i)}}$



Forces applying on particles

- Hydraulic forces
- Mechanical forces

Chromite grade and PSD analysis

In-out analysis for each survey i Accumulation_i = $\frac{[\%Cr_{(DU,i)} - \%Cr_{(MD,i)}]}{\%Cr_{(DU,i)}}$

■ >106 µm ▲ <38 µm ▶ head grade</p> 25% $R^2 = 0.85$ 20% $R^2 = 0.83$ 15% 10% Acc. 5% 0% 71% 72% 73% 74% 75% ▶76% -5% -10% slurry per cent solid

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Chromite grade and PSD analysis



Conclusions

Research outcomes

- Particle-based analysis is necessary to deeply understand ball milling
- Low slurry density increase coarse chromite residence time and thus fine chromite formation
- In a UG2 processing plant : PSD and chromite content can be monitored with image analysis

To do

• develop methods to identify more minerals