

# Let us 'Torque' GG2 Thickeners

## ABSTRACT



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### **Motivation**

Dense Medium Separation (DMS) plants have a thickening stage where ultrafine material is handled, and large volumes of process water is recovered for reuse. The GG2 plant has a total of two thickeners that treat material from four areas viz. GG6: expansion (small coal plant), GG6: secondary plant, GG6: Heavy Medium Cyclones and Vessels (HMC and HMV) plants and GG4&5: Desliming Screens and the Wet Screen House.

The thickeners are designed to treat ultrafine material (-500  $\mu\text{m}$ ) but can handle material with a top size of 1 mm. The feed to the thickeners is mixed with a polymer solution that enhances gravitational settling of the particles, creating a dense slurry bed at the bottom of the thickener. The settled slurry is moved towards the centre of the thickener using a rotating rake, the slurry is then pumped out for filtration.

Rake torque is the most fundamental instrument and an accurate indicator of when things have already gone wrong. Coarse material (material larger than 1mm) is the most common cause of high torque on the GG2 thickeners rake drives, accounting for up to 85% of the downtimes with the remaining being weathered material from mining.

The source of coarse material typically comes from a situation where a screen panel has moved out of place and coarse material reports to the thickeners. According to historical data, the plants have, between July 2020 and June 2021, lost a cumulative of 66 hours of production time due to thickener high torque.

The overall estimated revenue loss associated with the downtime was estimated to be R30,5 million. The aim of the project is to investigate suitable solutions to minimise/eliminate the GG2 thickener downtimes to coarse material.

## **Problem Statement**

The GG2 plant thickeners experiences high torque on the rake drive. This occurrence results in the mentioned plants standing, thereby either losing out on the opportunity for production, or worse, the plants standing silos full and impacting mining. This becomes an even bigger issue when trying to address the problem as quickly as possible as the source of the problem is not easily identified, thus resulting in long standing hours.

## **Methodology**

The PIT (Professional-In-Training) evaluated different solutions that will yield the highest value in terms of addressing coarse material reporting to the thickeners. The following solutions were considered and are being applied:

- Installation of an oversize protection screen, coupled to the thickeners protection cone,
- installation of grids and blocked chute sensors in the launder feeding the thickeners (real-time technology),
- installation of accelerometers to detect dewatering cyclones blockages (real-time technology). A Proof of concept (POC) project.

## **Key Business Drivers**

The project business driver that the project covers are as follows:

- Improve plants availability

## **Results and Conclusion**

The findings thus far were:

- The installation of the test grids in the launder have proved to be value adding in trapping coarse material from the HVM plant.

- The solution was approved for rolling out on the HMV launder. Next step is to test the HMC and Small Coal Plant launder



*Figure 1: HMV launder grid that has trapped coarse material.*

- The current installation has proven that should each system be isolated, no single system will impact the others.

## **Recommendations**

The recommendations thus far as follows:

- The launder grids should be coupled with a blocked chute detection instrument that will use real-time technology to report deviations in time,
- to allow efficient use of the launder grids, the system should be coupled to the control room for in-time reporting of coarse material reporting to the launder,
- continue with Cyclones Blockage detection POC as the accelerometer technology has proven to work in other applications throughout the organisation, and that detection will move closer to the source of the problem and addressed faster.

## **Roles of the PIT**

The role of the PIT in this project consisted of the research into two of the three solutions proposed, management and execution of the project as a project manager.