



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA



## Upgrade of Iron Ore Gravity Reclaim Stockpile to increase Live Capacity

### Project Scope:

**Bulk Material:** Iron Ore Fines

**Equipment:** 42,000 cubic metre conical stockpile with two reclaim hoppers for train loading, Figure 1

**Problem:** Insufficient live capacity due to rathole formation above reclaim hoppers, Figure 2

### TBS Solution:

In order to provide a cost effective solution, TBS proposed to keep the existing drawdown hoppers and place hopper extensions above the existing ones to increase the inlet dimension, and therefore, the rathole dimension. Extensive flow property testing was conducted on the many types of iron ore fines to be handled through the stockpile, the results of which were used in designing the hopper extension to promote mass-flow that would ensure that the ratholes formed are governed by the hopper inlet dimension, rather than the hopper outlet dimension.

The flow property results also highlighted that the existing drawdown hoppers would not mass-flow for a number of the ores handled. This seems to indicate that the existing hoppers would need replacement to solve the insufficient capacity problem.

The hopper extension has been carefully designed as two plane flow hoppers with vertical end walls and sloping side walls at the angle required for plane mass-flow, as shown in Figure 3.

The hopper extension has eliminated high surcharge pressures on the existing hoppers and prevented the formation of stable ratholes within them.

### Project Outcomes:

Stockpile live capacity has increased by approximately 70%. This has had a dramatic impact on achievable train loading speeds. Prior to the modifications, the train speed was limited to 0.7 kph to avoid running out of ore and now loading can be comfortably maintained at a train speed of 1.5kph. Figure 4 shows a picture of the partially drawn down stockpile after the modifications.

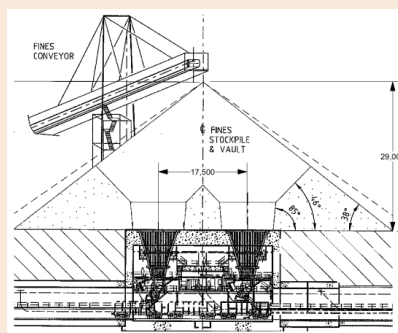


Figure 1: Original Stockpile and Reclaim Hoppers

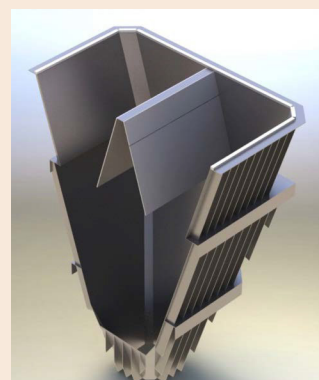


Figure 3: Twin Plane Flow Hoppers Extension above Existing Pyramid Hopper



Figure 2: Rathole Formation Reducing Live Capacity



Figure 4: Post Modifications Stockpile Drawdown

Advancing the Bulk Materials Handling Discipline Globally

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