

Project Scope

Train Load-Out Bins are critical to the operation of mine sites. The load-out station is often one of the most important links to the handling chain, and any downtime with the load-out station directly impacts export tonnes. To ensure an effective train load-out bin design the following analysis is recommended;

- Study of material flow properties to be handled by the bin. This information can be used to calculate wall angles for mass flow, or to determine the optimal design if funnel flow or expanded flow is to be used.
- Dynamic load calculations for the loads due to the central core, slumping loads and also loads on the chute.
- Silo quaking analysis to determine critical frequencies and range of quaking loads that may be experienced.

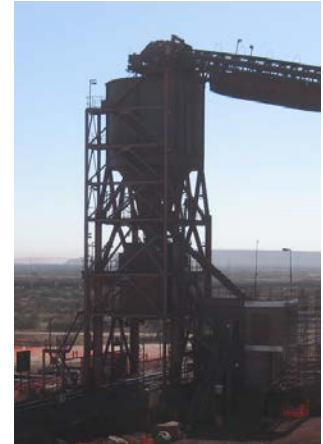


Figure 1: Train Load-out Bin

Silo Quaking

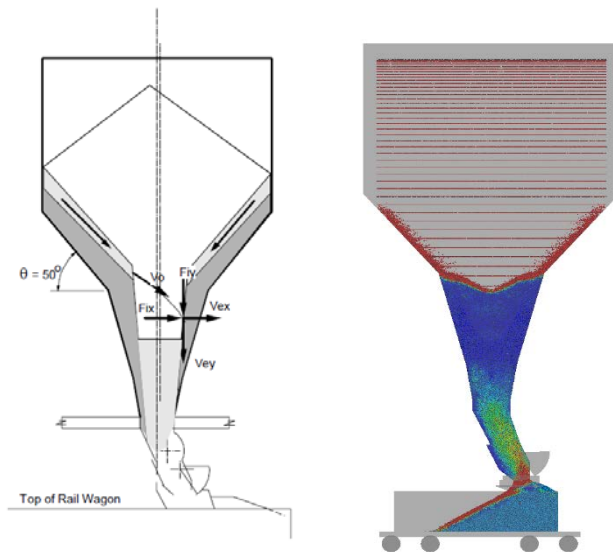


Figure 2: (a) Load analysis (b) DEM Modelling

Silo quaking is a phenomenon that is particularly prevalent in train load-out bins. This is due to the very large load-out rates that are needed to fill the wagons quickly.

There is still further research required to fully understand this complex mechanism, but there is a simplified approach which has been used previously, which has correlated well with on-site measurements, that includes both a continuum type approach as well as the Discrete Element Method (DEM). Using these methods it is possible to make calculations for load frequency and load magnitude.

Load-Out Patterns

The load-out rate from a bin is such that there is a large initial surge of flow, as high as 40,000 – 60,000 tph, and then choked flow occurs to fill the rest of the wagon. Calculations can be made for flow rates and volumetric filling of the wagon over time.

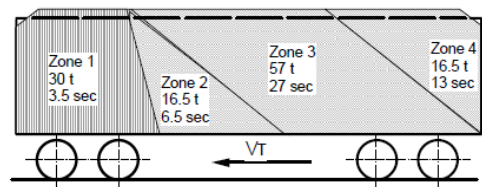


Figure 3: Analysis of load-out bins and the filling of wagons

For more information regarding this project or if you wish to make an enquiry, please contact:

TUNRA BULK SOLIDS
Dr Tim Donohue

Newcastle Institute for Energy and Resources (NIER)
The University of Newcastle
Off Vale Street
Shortland NSW 2307, Australia

Email: enquiries@bulksolids.com.au
Ph.: +61 2 4033 9055
Fax: +61 2 4033 9044
<http://www.bulksolids.com.au>



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