THE UNIVERSITY OF NEWCASTLE AUSTRALIA

TUNRA BULK SOLIDS

Conceptual Design of Double Spoon Transfer Chute

Project Scope:

Bulk Solid Material: Potash

Equipment: Transfer Chute at the end of a very long, fast moving feeder, handling potash at 6000t/h

Problem: Limited head height, wide and slow moving stream, steep outgoing belt inclination

Aim: Re-direct and accelerate material stream from feeder up to outgoing belt speed of 5.5m/s

Conceptual design of a transfer chute handling potash was performed under limiting conditions and structural constraints. Head height available was limited to approximately 2.3 metres, with the feeder loading velocity of 1.7m/s. The high inclination of the outgoing conveyor of approximately 14 degrees also added difficulty. This was all compounded by the significant quantity of material (stream cross section of 1400 x 700mm) to be re-directed and accelerated up to outgoing conveyor belt speed while ensuring central loading.

Numerical Analysis and Optimisation:

A number of different concepts were investigated and two options are shown in Figure 1. The design of each concept was optimised through the application of continuum and DEM analysis to maximise the loading velocity, V_e, on the outgoing belt. This resulted in a double spoon design implemented as shown in Figure 2.

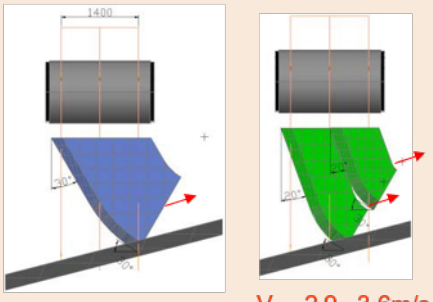

Figure 1: Concepts Investigated

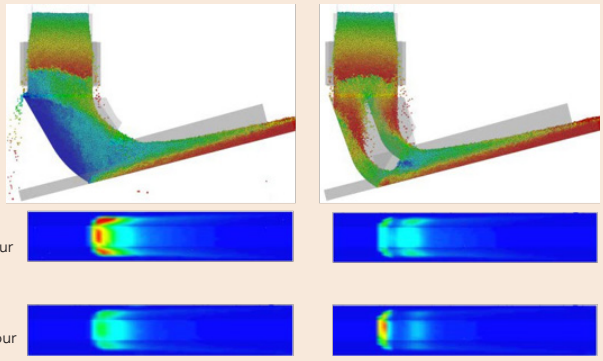

Figure 2: Single vs Double Spoon Results

Conceptual Design and Project Outcomes:

To account for possible variation in throughput and feeder speed and ensure central loading, an impact plate deflector was incorporated. The final design is shown in Figure 3. Upon completion of the project, the client opted to increase the width of the outgoing belt by 20% and reduce the speed to 4.1m/s. Following fine tuning of the deflector position to accommodate the revised criteria the design was installed at a Canadian port terminal. The client has indicated the transfer is performing as expected.

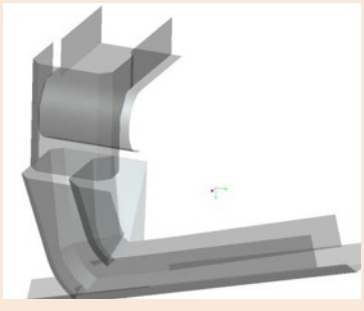

Figure 3: Final Design

Advancing the Bulk Materials Handling Discipline Globally

For further information:
www.bulksolids.com.au
enquiries@bulksolids.com.au

Or phone TUNRA Bulk Solids:
+61 2 4033 9055